SEPTEMBER 3, 1960

Chemical Week

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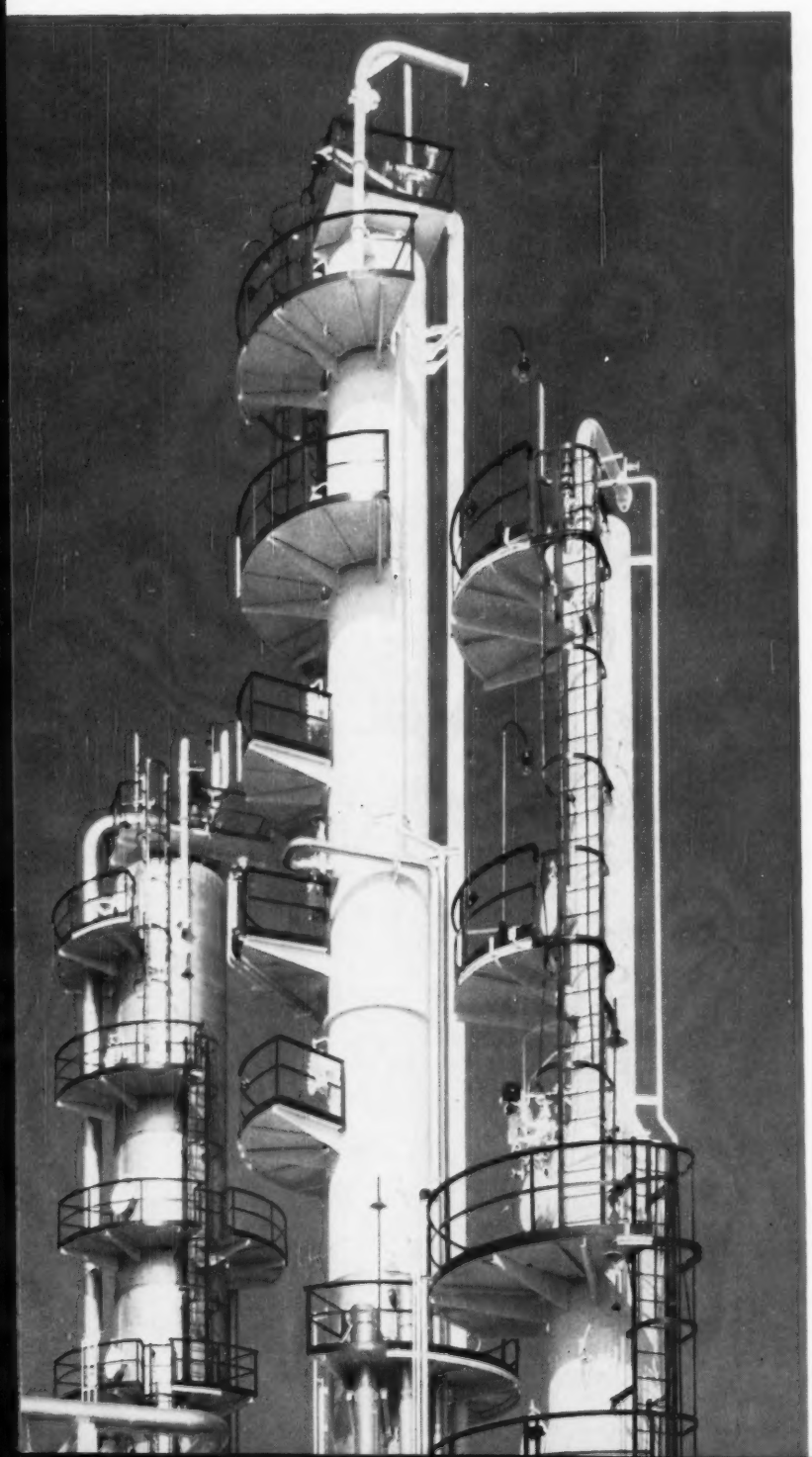

Pressure on prices — competition beats down chemical tags, trims profits . . . . . p. 21

BUILDING OVERSEAS? LOOK FOR FASTER FOREIGN EQUIPMENT DELIVERIES . . . . . p. 32

Atomics and the public — how to win community acceptance of your atomic projects . . . . p. 49

Fluidized-bed coatings — "dry" painting system fattens market for resin powders . . . . . p. 56

Glass industry's $65-million research effort hits hard at

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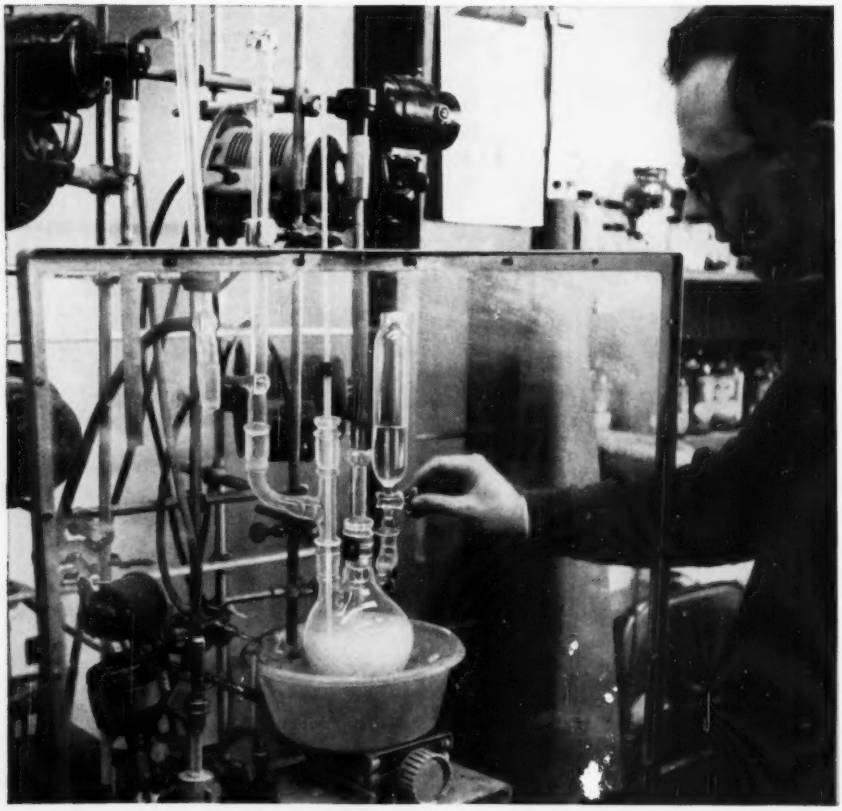
Conducting an experimental epoxidation reaction at SOLVAY Technical Service, Syracuse, N. Y.



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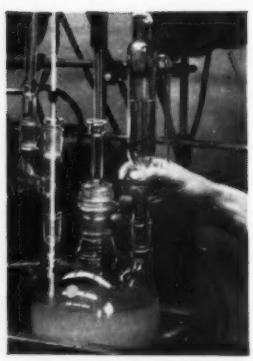

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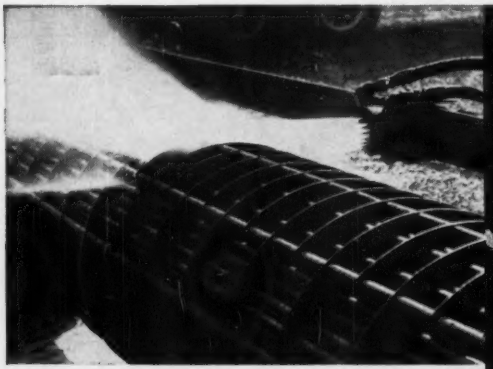
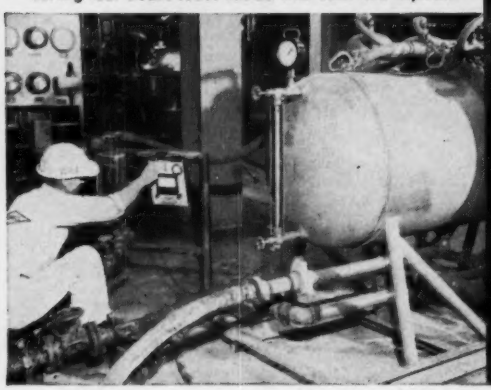


Jetting tool cleans tubes fouled with coke and asphalt.



New mobile foam-cleaning equipment cuts cleaning costs.

Cleaning missile lines and components requires tolerances as close as 150 microns.

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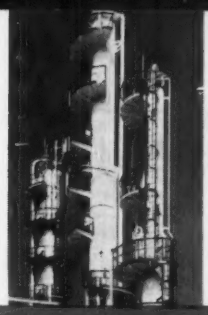

ON THE COVER: Badger N. V., Dutch affiliate of Badger Manufacturing Co., built these fractionating columns for Esso's 100,000 bbls./day refinery in Rotterdam, Netherlands.

Chemical Week

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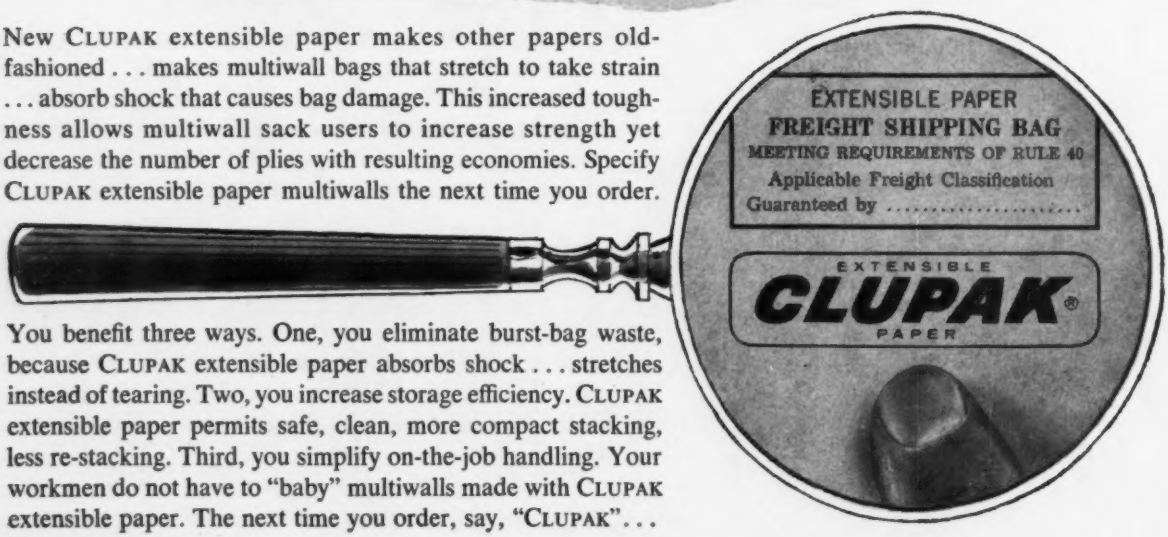

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Efficiency Is a 'Must'

THIS HAS BEEN A ROUGH YEAR for plant and corporate management to be involved in labor contract negotiations. The already completed negotiations, which normally are used as guideposts to labor's demands, have thus far not set a clear pattern—except on one point. But that one point—maintenance work regulations—looms as the most costly item of plant operations for a long time to come unless management can find new convincing arguments to back its stand.

With today's maintenance force representing, in some cases, over 50% of the total plant wage roll, compared with 20% or less a few years ago, efficient working techniques are a must. Maintenance has long lagged behind other functions in streamlining aperations, yet in many cases, the workers are now balking at changes.

For example, management has a well-taken point in contending that it is inefficient to carry out a maintenance job using seven or eight craft mechanics, each doing his small craft-determined part of the job, when it could be done by one or two mechanics who have multiskills.

However, plants are often blocked in their attempts to convert the maintenance force from a craft to a multiskilled group. And some plants that have received a vote of approval to try it, find after a trial that they must back away because of sudden vigorous opposition.

A management charge of featherbedding sometimes hits close to the truth. But whether it is made openly or only whispered, it is a sign of management's inadequacy at managing.

Part of labor's attitude is normal resistance to change. Part is also a normal desire by labor to test management's strength. But the major part is based on the simple truth that management has failed to give the worker something in return for what it wants to get.

Certainly management feels that a worker is more valuable if he has more than one skill or can be deployed in a manner that management says is most efficient for getting the job done most effectively. But is the worker convinced that he is more valuable? For example, is a jack-of-all-trades worth more on the open labor market than a master of one? Or will the most efficient deployment of labor for getting a job done eventually lead to unemployment for some?

These can be difficult questions to answer. Obviously management has an obligation to the workers that it must be sincere in fulfilling. Better wages is usually a partial answer. Perhaps if the further training some workers require can be equated to an advanced technical school or two-year college degree, that too can be a partial answer. And management must offer some guarantee of full-time employment.

But it is a two-way street. What obligations should workers have to management? A full day's work with the understanding that seniority is no shield against dismissal. And acceptance of the facts of life—that advancement should be based on merit and ability, not seniority.

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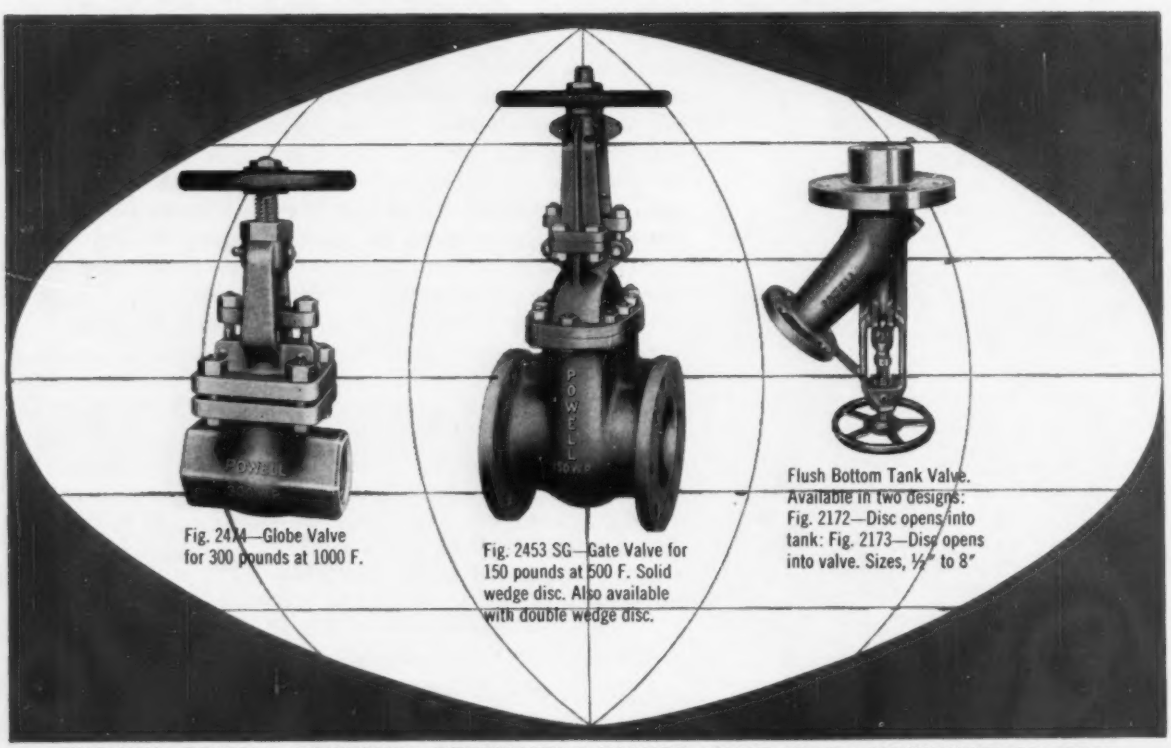

Fig. 2474—Globe Valve for 300 pounds at 1000 F.

Fig. 2453 SG—Gate Valve for 150 pounds at 500 F. Solid wedge disc. Also available with double wedge disc.

Flush Bottom Tank Valve. Available in two designs: Fig. 2172—Disc opens into tank: Fig. 2173—Disc opens into valve. Sizes, ½" to 8"

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LETTERS

Assuming Success

To the Editor: Regarding your Dow-Maruzen joint phenol project item (*CW Business Newsletter, Aug. 13*). . . . Assuming that these negotiations are successfully completed, the plant will certainly not cost "$44 million."

H. Matsunaga
Director
Maruzen Oil Co., Ltd.
New York

Cost: $4.4 million.—Ed.

Years Ahead

To the Editor: Congratulations on an interesting Market Newsletter item about phthalic raw materials (*Aug. 6*). It would present a most accurate picture of the existing situation, if it were not for one rather serious error:

Your statement that Amoco now has the only U.S. plant making phthalic via the orthoxylene route. Oronite Chemical Co. not only is the largest U.S. producer of phthalic from *o*-xylene. Also it was onstream and producing in '45—some 15 years before Amoco got into the business.

T. M. Welton
Vice-President
Oronite Chemical Co.
San Francisco

To the Editor: The space devoted to phthalic anhydride manufacture . . . was completely justified. However, certain inaccuracies appeared that are perhaps inevitable in any attempt at complete coverage of a complex subject. . . .

(1) Oronite Chemical Co. uses an orthoxylene route to produce phthalic anhydride in addition to Amoco, which is listed as the "only U.S. plant to make phthalic from the orthoxylene."

(2) Concerning your statement, "Petronaphthalene should be considered the second source of supply for naphthalene in this country, since the orthoxylene route has not yet proved itself economically," petronaphthalene is, of course, the *only* second source of supply for naphthalene. However, orthoxylene has certainly proved itself as an economical raw material for phthalic anhydride, and competitive with naphthalene, regardless of the source of naphthalene.

(3) Contrary to your statement that no technical advances with orthoxylene have been made in the U.S., we would like to recall your attention (*Chemical Week, June 11, p. 82*) to the SD development of a new catalyst for fixed-bed processes that permits the utilization at high yield of either naphthalene or orthoxylene, and also mixtures of naphthalene and orthoxylene, depending on their availability and price.

Ralph Landau
Executive Vice-President
Scientific Design Co. Inc.
New York

Readers Welton and Landau are, of course, correct on the Oronite slip. However, CW sticks with its analysis of future U.S. phthalic anhydride raw-material requirements. In the West, where naphthalene supplies are limited, Oronite's phthalic from the o-xylene route has proved successful. But in the rest of the U.S., the economics of o-xylene have not justified its replacing naphthalene as a raw material for phthalic. Perhaps the new SD catalyst will provide the key for "the big technical advance" that is needed.—Ed.

MEETINGS

Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 7-9.

American Chemical Society, National meeting, New York, Sept. 11-16.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Sept. 13.

Chemical Exposition U.S.A. 1960, Sept. 13-15, Hotel Statler Hilton, New York. Exposition held concurrently with 138th national meeting of the American Chemical Society. Admission to exhibits free to industry representatives.

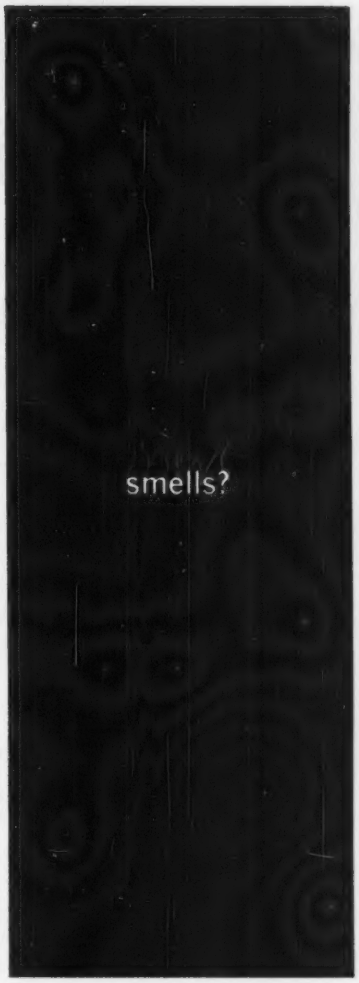
Drug, Chemical & Allied Trades Assn., 70th annual meeting, Sagamore Hotel, Bolton Landing, Lake George, N.Y., Sept. 15-18.

Chemical Market Research Assn.; theme: "The European Chemical Industry"; Wentworth-by-the-Sea, Portsmouth, N.H., Sept. 22-23.

American Assn. of Textile Chemists & Colorists, 1960 national convention, Sheraton Hotel, Philadelphia, Pa., Oct. 6-8.

International Plastics Congress, Amsterdam, Holland, Oct. 10-12.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, Oct. 11.



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Color 5¼" Lovibond Yellow	1.5 max.	12 max.
Color Gardner 1933		2 max.
Unsaponifiable		0.50% max.
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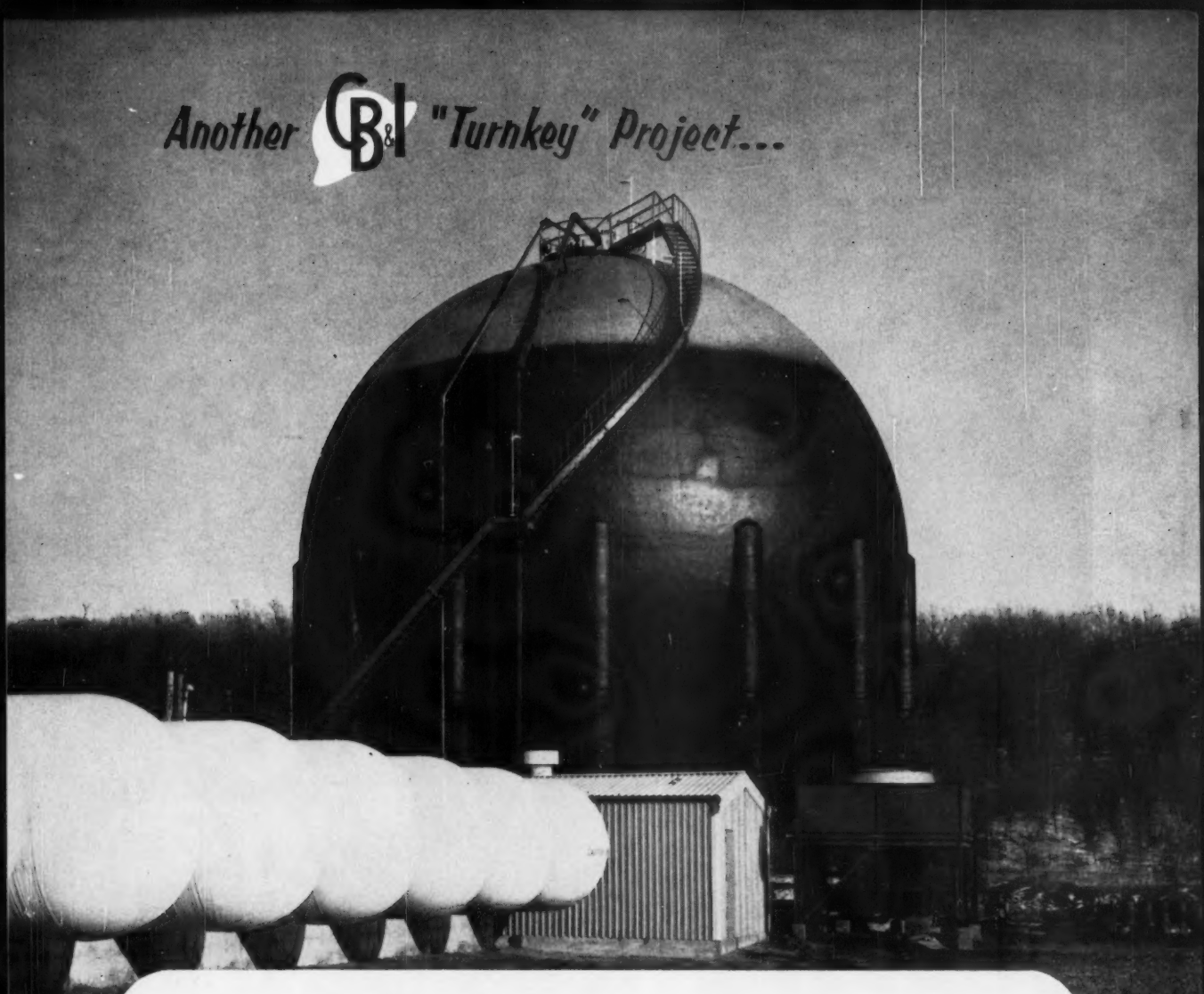

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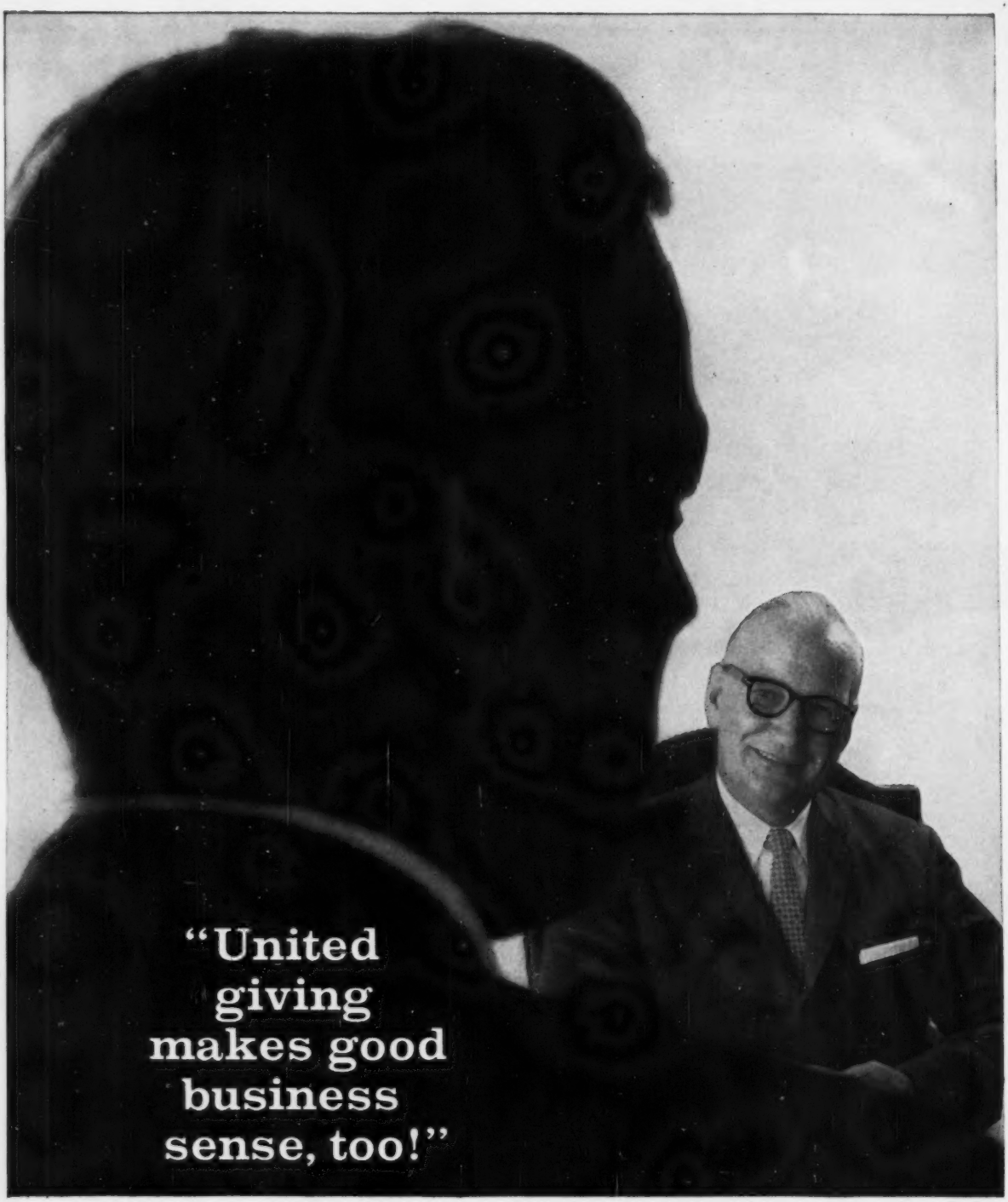

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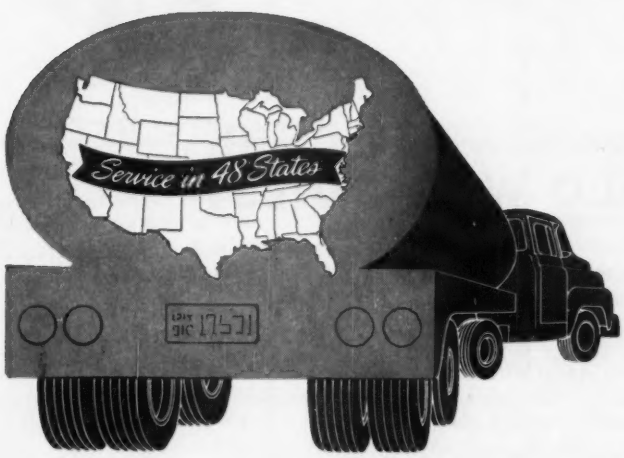

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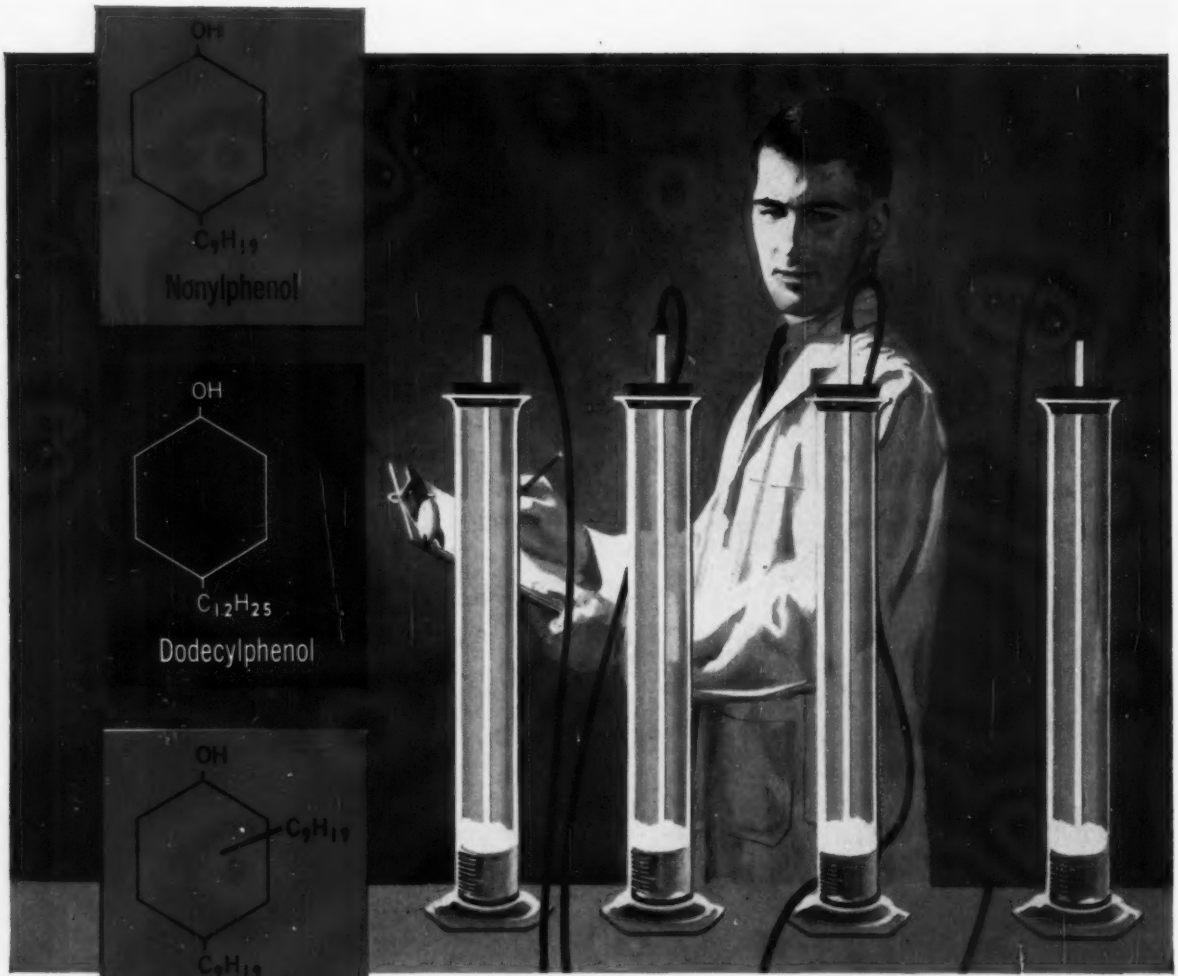

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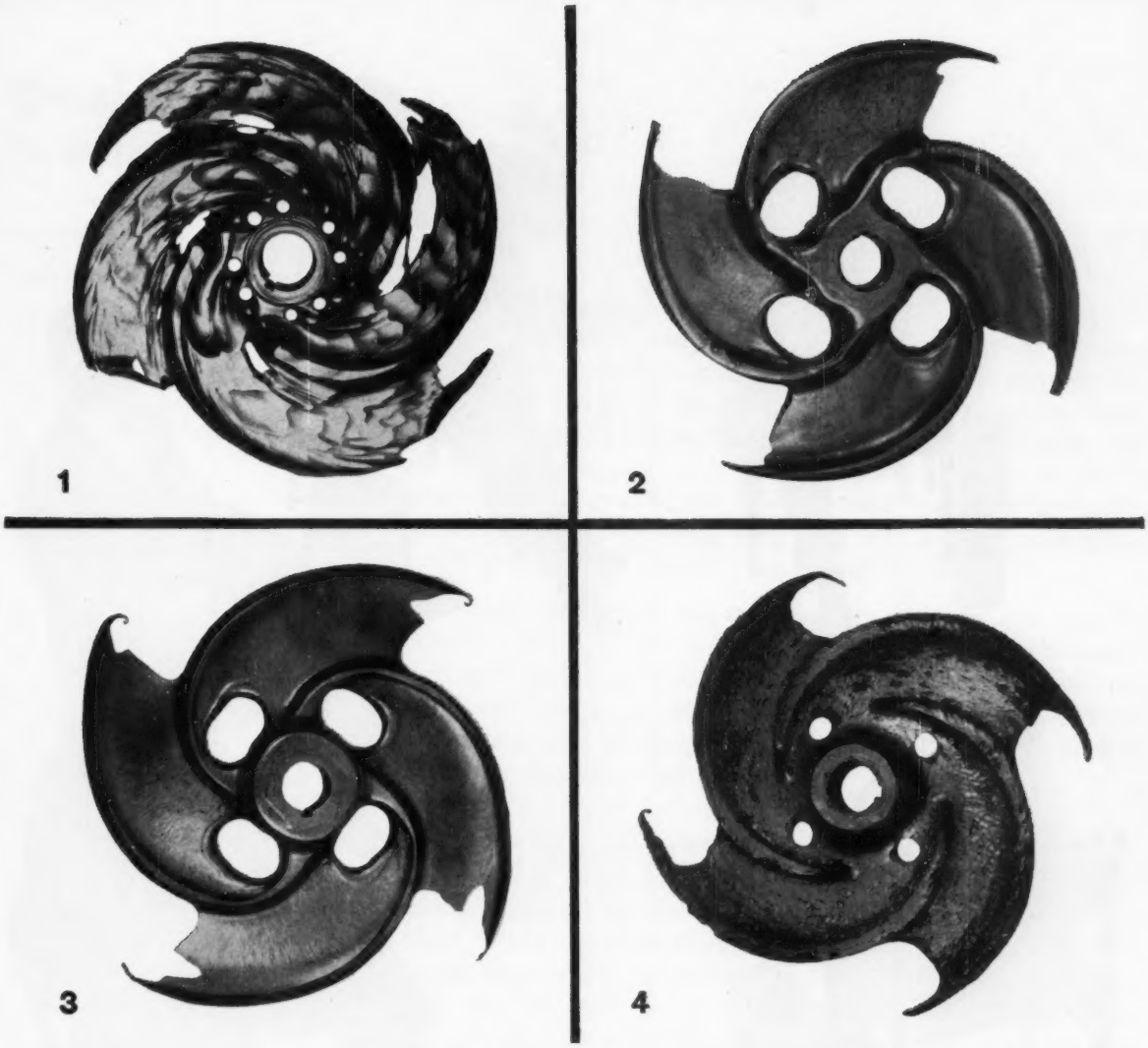

HOW GOOD A PUMP DETECTIVE ARE YOU?

Each impeller above is made of Worthite, an austenitic chromium-nickel-molybdenum stainless steel. Each was selected for its corrosion and abrasive resistance to the fluid being pumped. Each was in a pump correctly selected for the hydraulic problem to be faced. But each wore out long before necessary. Can you tell why by looking at the impellers?

In figure No. 1, the impeller handled lime mud in a paper mill. The deep gouges are caused by large chunks of lime. The feathered edges are caused by churning in the mud at start-up and when the suction tank was almost empty. Agitation of the liquid in the suction tank and by-passing solved the problem.

In figure No. 2, the Worthite impeller handled 65% potash slurry from the bottom of a thickener. It lasted 3 months. The percentage of solids was too high and the pump was operating at too high a capacity. By operating nearer the maximum efficiency and with a slight reduction in solids, the life of the impeller was more than doubled.

In figure No. 3, the impeller handled fine (48 mesh) potash slurry with some sharp sand. The pump flow was controlled by throttling the suction. By eliminating throttling of suction and installing a by-pass, impeller life was increased from one to about four years.

In figure No. 4, the pump delivered 50% by weight slurry to a plate and frame filter press. As the filter filled up, the pump operated back toward shut-off, causing wear on the outer third of the impeller vanes. The solution was to shut the pump down when adequate filter cake had been built up, but before the pump began to operate against shut-off. Impeller life increased three times.

Now, why did the impellers wear out long before necessary? It wasn't impeller material or pump selection. It *was* the system on which the pump was used. Seemingly small factors in installation or operation prevented achieving the full economy promised by Worthite in handling corrosive-abrasive fluids.

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For specifications and local offices, see our insert in Chemical Materials Catalog, pages 475-482 and in Chemical Week Buyer's Guide, pages 37-44.

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NITROGEN DIVISION

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Business
Newsletter

CHEMICAL WEEK
September 3, 1960

Diamond Alkali will go ahead with its acetylene project in Texas (*CW Acetylene Report, March 26, p. 68*).

The multimillion-dollar plant—using natural gas and oxygen as raw materials—will be designed to supply all the acetylene requirements for Diamond's vinyl chloride and polyvinyl chloride units on the same site at Deer Park, near Houston. Since Diamond is expanding those units 50%, to about 75 million lbs./year, industry sources estimate that the new acetylene plant will have a capacity of about 35 million lbs./year. The oxygen needed—up to 85,000 tons/year—will be delivered (probably by pipeline) from an air-separation plant to be built somewhere along the Houston Ship Channel by Union Carbide's Linde Division.

The Linde project also includes construction of a pipeline to supply oxygen to the Houston Works of Armco Steel's Sheffield Division. The steel mill and the proposed acetylene plant are on opposite sides of the ship channel and about 5½ miles apart. There's speculation that the Linde plant ultimately will supply oxygen and nitrogen to other chemical and petrochemical plants in the area.

•

Other expansion moves this week: Olin Mathieson is starting to build a $13-million chlorine and caustic soda plant on a 600-acre site near Charleston, Tenn., on the navigable Hiwassee River. Electric power for this plant—which is to be in production by the end of '61, with capacity of 180 tons/day—will be supplied by Tennessee Valley Authority. Phillips Chemical will add about 35 million lbs./year to its capacity for linear polyethylene near Houston. This project—to bring the company's total PE capacity to about 100 million lbs.—will be carried out in stages, with first-phase completion set for this Nov. 1. And Vitro Minerals' beryllium program gets a boost from the U.S. Dept. of the Interior, which has just granted to Vitro the first exploration loan since regulations were changed to cover prospecting for beryllium minerals other than beryl.

•

A potential source of phosphate rock is being probed in Tennessee. Two major chemical companies, Virginia-Carolina Chemical (Richmond, Va.) and Armour Agricultural Chemical (Atlanta), have been core-hole drilling about 50 miles south of the big deposits being worked in Maury and Williamson counties and within 200 ft. of the Alabama state line. The new ore body—a low-grade, brown, marginal deposit—extends 15 miles south into Alabama along the Elk River in Limestone County. Both companies indicate they will not disclose the results of their sample analyses.

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American Rubber & Chemical isn't wasting any time getting its new Phillips-licensed synthetic elastomers—polybutadiene and polyisoprene—into production. This company—joint venture of Stauffer Chemical

and American Synthetic Rubber Co. (Louisville, Ky.)—has just awarded a contract for a semiworks plant to Crawford & Russell (Stamford, Conn.) to produce new elastomers via C&R's elastomer-solvent system (*CW, Aug. 20, p. 62*). A contract for a full-scale elastomer plant—construction costs estimated at $12 million—was awarded last month to C. F. Braun (Alhambra, Calif.). The commercial plant is to be in production by Sept. '61; the semiworks plant—on the same site—will be completed later.

•

Another petrochemical contract awarded last week: American Oil has let a contract to Fluor Corp. for construction of its huge alkylation unit—part of a major modernization program now under way at its Texas City refinery. The unit will convert feedstocks into 14,600 bbls./day of alkylate, a high-octane component for the company's unleaded premium fuel. Reported earlier: M. W. Kellogg is building the 150,000-bbls./day catalytic cracking unit to be in operation in late September. The whole program is targeted for early '62 completion, the three new units replacing six old ones.

•

Dow Chemical's Spanish petrochemical plans are progressing. This week the Spanish government approved an agreement for Dow to invest a reported $9 million in Union Quimica del Norte de Espana (Unquinesa), thus acquiring a 50% interest in that concern. If further clearance is granted, the Dow-Unquinesa joint venture will build a cracking unit to produce ethylene, propylene, butadiene and off-gas—which would go into polyolefins, polystyrene, and other chemicals and plastics.

•

Five U.S. companies are unveiling plans for a $74.5-million petrochemical project in northern Argentina. Partners in this proposed joint venture—Fish International Corp. and Continental Oil (both of Houston, Tex.) and Cities Service, U.S. Rubber and Witco Chemical (all of New York)—have formed an Argentine corporation, called Pasa, to own and operate the facility, which would be built at San Lorenzo, a deepwater port on the Parana River. Projected output: synthetic rubbers, 45,000 tons/year; carbon black, 11,500 tons/year; styrene (in addition to captive requirements for synthetic rubber), 7,000 tons/year; aviation alkylate, 1,290 bbls./day; benzene, 839 bbls./day; plus various antioxidants and other benzene-derived rubber chemicals. This project and the synthetic rubber plant proposed by Texas Butadiene & Chemical (New York) for Puerto Deseado in southern Argentina (*CW Business Newsletter, Aug. 27*) are both up for final approval by the Argentine government.

•

To meet increasing demand by the Mexican tire industry, Celanese Mexicana will produce nylon tire cord starting the first quarter of next year at its Toluca, Mex., plant. Firestone Tire & Rubber will design and process the necessary equipment and supply continuing technical assistance. Allied Chemical and other caprolactam producers will supply the raw material. With a capacity of 2,000 tons/year the new Celanese plant will permit the country's tire industry to fill its total requirements with cord produced in Mexico.

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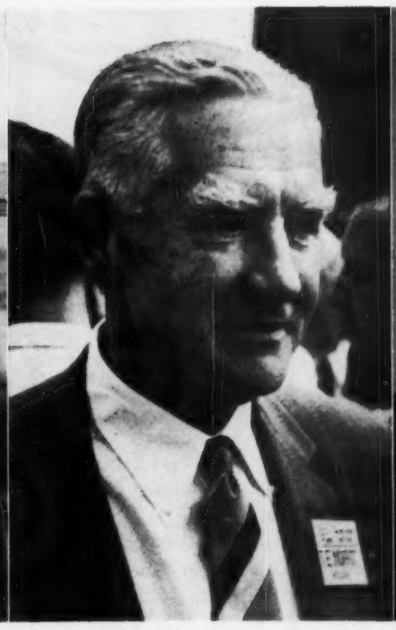
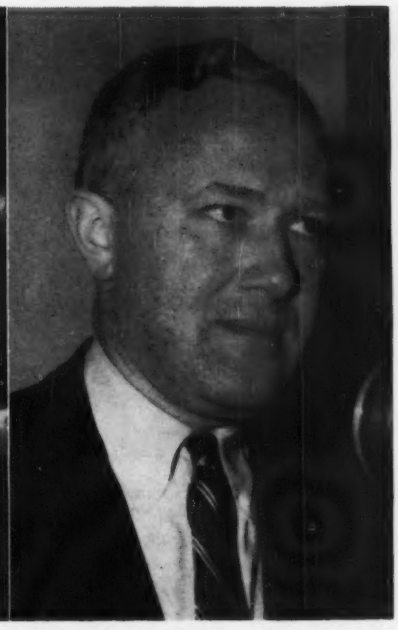
Monsanto's Queeny: Imports force some prices to unprofitable levels.



Hooker's Moffitt: No near-future let-up likely in price-profit squeeze.



Wyandotte's Semple: In most sectors, brisk rivalry and overcapacity.

Chemical Profits: Still on Sick List

As the last few corporate earnings statements for first-half '60 trickle in from chemical companies this week the pattern of diminished profit margins—despite higher sales in many instances—becomes more pronounced (CW, Aug. 6, p. 21). And it's a situation likely to get worse before it gets any better.

That, at any rate, is the consensus revealed in CHEMICAL WEEK's spot-check this week of large, small, and medium-size chemical firms across the nation.

There are many reasons behind the marked contraction in chemical profits. Among the most jolting are these:

- Price cutting (official and otherwise)—brought on by intensified competition among domestic producers and from low-cost foreign imports.
- Spiraling manufacturing costs—resulting from production cutbacks, labor "gains," increased transportation rates, and climbing raw-material prices.
- The growing need to increase "set-asides" for depreciation purposes.

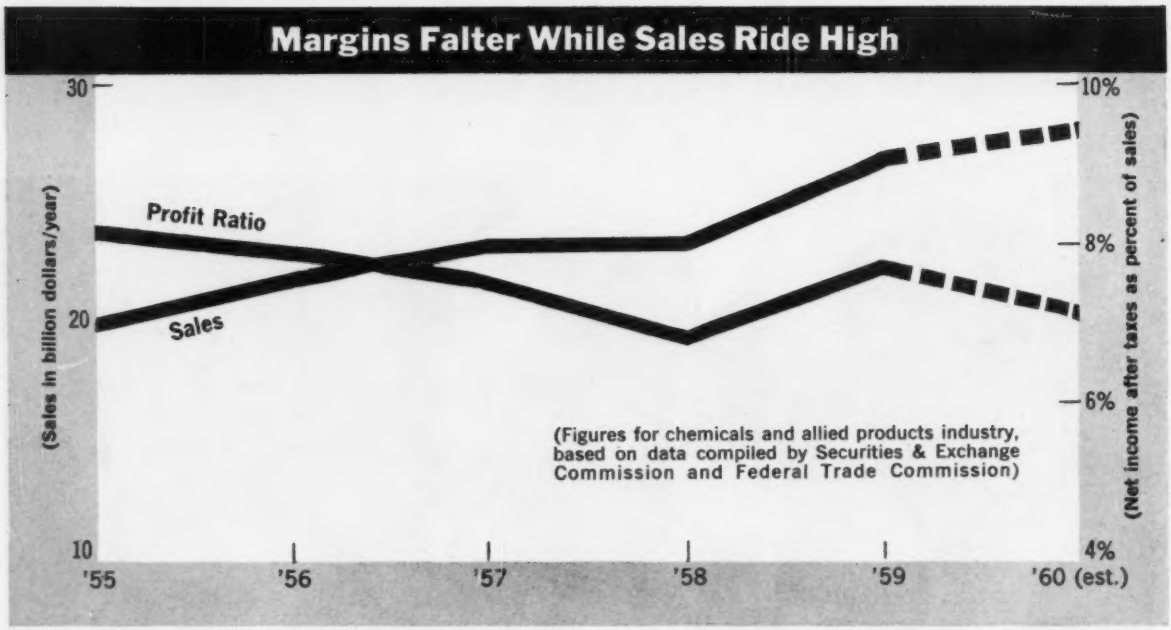
In addition a number of chemical makers, particularly those whose sales have tumbled, admit that overoptimistic sales forecasts led to stepped-up production that caused inventories to "back up to here" when those sales did not materialize.

Nothing New: But by and large, narrowing profit margins isn't a problem that popped up just this year; it has perplexed management since the post-Korean period, at least. At that time the economy was swinging into high gear; chemical demand reached peaks in '55, for example, that, for some commodities, haven't been matched since. The industry was in the midst of a capacity expansion binge that brought on a king-size market supply hangover. Cases in point: ammonia, polyethylene, sulfuric acid, acetone, aniline, chlorine, glycerin, caustic soda. In fact, by mid-'56 supply of just about all chemicals was more than adequate to fill demand.

This excess productive capacity has put heavy pressure on prices. It shows up clearly in the steady downward curve of many major companies' composite price index of products. Typical of the decline is Du Pont's. Its sales at midyear were slightly above $1,097 million (some $29 million higher than the comparable period in '59), but its half-year net operating income was down about 10%. The firm's price index rose from 104 in '49 to 112 in '51, then slipped steadily until now it's down to 101.3.

Dow's price index, based on more than 200 products, is another good example: last year it stood at 99; today the index is down to about 96.

No Show: But price cuts don't always show up in statistics. Most chemical sellers insist on maintaining "quoted" list prices in public. But when it comes down to clinching an order, deals can be made. These "hidden" price concessions include



under-the-table rebates, special freight allowances, unreasonably long credit terms, and out-and-out discounts.

Discounts, especially, are a favorite gimmick, often involving juggled quantity rates. When discounts are offered, neither the contract conditions—e.g., notification period for price changes—nor the official price schedules need be altered. Discounts also carry the implication that the reduced price can be withdrawn at any time.

Last month Union Carbide Plastics made resin news by lopping up to 5¢/lb. off low-density polyethylene prices (*CW, Aug. 20, p. 22*). The company said, in essence, that it was "attempting to broaden markets." Within hours, practically every other producer had followed Carbide's move, lending credence to the general trade talk that polyethylene prices had been "soft" — i.e., less than posted schedules—for some months. UC cut 2½¢/lb. off its low and medium polyethylene resins last December, and candidly said then that the action was designed "to eliminate some spot price-cutting by other sellers."

Domestic tags on polyvinyl chloride resins have also been consistently beaten down over the past few years by shrewd intra-industry maneuvers, low-cost imports and, frequently, by the desire of major producers to "broaden markets." For example, average prices of general-purpose PVC have been dropping steadily since '55, when the list was approximately 31¢/lb. Most PVC resin sellers are currently quoting about 23¢. But the influx of cheaper Japanese material has forced U.S. prices down, in some areas, to below the domestic quote.

Competition, oversupply, piled-up inventories also have contributed to a dull profit picture for styrene, toluene, sulfur, heavy acids (e.g., sulfuric and hydrofluoric), and textile products such as rayon and nylon.

General nature of the problem is attested to by Wyandotte President Robert Semple: "In virtually every sector, selling is very competitive. Even with the high level of sales we are enjoying, our industry has surplus capacity." Monsanto's, Edgar Queeny allots considerable blame to imports: "Our selling prices of various organic chemicals have been forced down to relatively unprofitable levels by imports." Hooker President Thomas Moffitt foresees little or no improvement in the cost-profit squeeze, "at least for some time ahead," but feels that for his own company, "more efficient and enlarged production, reasonable sales increases and promising new products" will result in "a substantial improvement in earnings over the long term."

Increasing capital requirements is one of the big reasons why the industry's profit ratio has been dropping over the past six years (*chart, above*). In this period, permissible pre-tax set-asides for depreciation, depletion and amortization — though still inadequate — are up 43.8%, to an estimated $1,185 million, this year.

Tough Problem: Is there a solution? In the postwar years, most chemical prices remained remarkably steady despite increases in costs of manufacturing. Reason: producers, through intensive cost-cutting programs, managed to absorb these increases. Unprofitable items were weeded out of product lines, equipment and plants were modernized to step up productivity, departments were consolidated to save money.

Now, most companies report, these programs have been pushed to the limit. The only recourse is to pass along to the chemical consumer some of these added costs of doing business. And there's the rub. In the current oversupplied buyers' market, price hikes just won't stick.

One prospect for profit-pinched producers: increasing demand for their products is beginning to absorb some of the tremendous overcapacity. The big poser is this: When will an in-balance market obviate the free-wheeling, ruinous, cut-throat competitive practices that have boosted sales in some instances but are still knocking the stuffings out of profit margins? It's a question for which industry leaders have no ready answer.

Now: Three for TEL-TML

This week newly appointed Houston Chemical Vice-President Thomas Young is taking first steps to translate Singmaster & Breyer blueprints into the country's third major tetraethyl lead and tetramethyl lead plant (CW Business Newsletter, Aug. 27).

Young—a former S&M partner who previously had been employed in the TEL section of Du Pont's Chambers Works—has 22 years of chemical engineering experience. The TEL-TML project he will supervise for Houston Chemical—a Chatham-Reading subsidiary—is causing some concern to two companies, Du Pont and Ethyl, which for years have had the gasoline additives market to themselves.

Tetraethyl lead production currently is running at a 550-million-lbs./-year clip (*CW, June 18, p. 115*). Last April, Ethyl reported startup of TML facilities at Baton Rouge, La.; and Du Pont, which has since hastened into the commercial picture at Deepwater Point, N.J., now promises "further TML expansion there late this year."

Precise capacity figures for TML are impossible to peg. Based on the hopes of HC officials, the new unit —to go up at Beaumont, Tex.—will account for about 10% of the total TEL-TML market. Thus it would appear that Houston Chemical is planning a 50-60-million-lbs./year unit.

Gasoline-containing TML—which Standard Oil of California officials predict will have about half the auto fuel market by '65—is now being marketed by that company and Socony Mobil. In Cal Standard's extensive promotion campaign for TML, the additive is described as the first new antiknock compound since TEL was introduced about 30 years ago.

Houston Chemical's Young: His project broadens the antiknock business.

What does TML do that TEL can't? Tests indicate it's more effective than TEL in the newer high-aromatic-content gasolines (*CW Technology Newsletter, April 30*)—an important factor on the West Coast, where a limitation of olefin content in gasoline is being prescribed by law.

In a few years, it's predicted, all European gasoline will contain TML (Mobil has just started marketing the product in Britain under the name Tetramel); and the big switch in the U.S. to small cars—and the new types of engines that will go with them—could win for TML a sizable share of the U. S. gasoline market by '65.

Not a TEL Replacement: Du Pont spokesmen hold that TML won't be a "substitute" for TEL—but a "supplement." It's just as safe and doesn't require any special handling, judging from tests carried out under a joint program of Cal Standard, University of Cincinnati Medical School and the suppliers, Ethyl and Du Pont.

Initially, TML is more costly—about 94¢/lb., compared with 57.-06¢/lb. for TEL. But 2.06 cc. of TML are equivalent to 3 cc. of TEL, and, in the long run, TML's price is expected to decrease.

Houston officials won't talk about process, but industry observers expect the company will use a fairly standard route, reacting sodium-lead alloy with ethyl chloride to get TEL and with methyl chloride—under higher pressure—for TML.

Right now, Young is targeting completion of Houston Chemical's $10-million plants for next September. And an all-out marketing push in TML is expected to shape up as the onstream date nears.

But the recently formed company probably won't stop there, industry sources predict. It may decide to produce its own ethyl chloride, ethylene dichloride and vinyl chloride. And from there it might take the step into vinyl polymers.

WIDE WORLD

Surgeon General Burney: After long study, an o.k. on live polio vaccine.

New Punch at Polio

Half a dozen U.S. pharmaceutical companies are lining up to produce the Sabin-type oral polio vaccine for which proposed regulations on licensing and manufacturing are expected to be disclosed by Surgeon General Leroy Burney of the U.S. Public Health Service this week.

In Washington last week Burney explained how he and his advisors finally decided to approve Dr. Albert Sabin's strains of live polio virus—as a supplement to the Salk-type killed virus vaccine that has been in general use in the U.S. for the past five years.

Burney said his agency's committee on live polio virus vaccine concluded that Sabin Type I and Type II strains made the best over-all showings in laboratory and field tests. The committee also recommends use of Sabin Type III strain, although it is less potent and shows a tendency to change its neurovirulence characteristics on passing through the human body.

The committee praised the "great contributions" of Dr. Herald Cox of American Cyanamid's Lederle Laboratories and of Dr. Hilary Koprowski at Wistar Institute (Philadelphia), but decided that their attenuated virus strains would not be suitable for commercial vaccine production.

Burney predicts the new vaccine will be available by mid-'61. Lederle and Pfizer are probable producers; Eli Lilly, Merck, Pitman-Moore and Wyeth may also apply for licenses.

New Force in Foams

Last week's move by Reeves Bros. (New York) to acquire Curtiss-Wright's $1-million Curon polyurethane foam business means the trade faces an aggressive new competitor. Reeves—which has been laminating the Curon to its fabrics on a job basis—has purchased C-W's patents, name, machinery and inventory.

The textile concern will give a strong push to Curon not only for fabrics but also for furniture. This will be a logical step after the transfer, early next year, of the foam-making operations from Curtiss-Wright's two plants in Quehanna, Pa., to a spot "nearer the furniture and carpet industries of the South."

Curon sales reportedly have been in the $8-10-million range; but Reeves, which will operate Curon as a separate division, has hopes of doubling or even tripling that figure in the next few years.

Curtiss Realignment: Word that Reeves acquired Curon came shortly after C-W's new chief executive officer, T. Roland Berner, came out with his plan for "amplification and reorientation of research activities." This includes: (1) giving Curtiss-Wright's nuclear reactor and auxiliary equipment to Penn State University; (2) selling Curtiss-Wright's research facilities at Santa Barbara, Calif., to General Motors; (3) bringing to Quehanna the missile research work that had previously been scheduled for Santa Barbara; and (4) making "thorough studies" to determine new fields for research and production.

The Curtiss-Wright chairman adds that the company will seek additional military business in fields where its capabilities are already established—such as propulsion, electronics and ultrasonics. He says the Quehanna Research Center is one of the world's leading producers of beryllium oxide ceramics for high-temperature nuclear reactors, and predicts several new contracts for these materials.

New Threat to Latex: Entrance of Reeves Bros. into the flexible-foam furniture market may give pause to latex producers, who already have lost ground in that market. It's estimated that nearly 50 million lbs./-year of urethane foam will be used in furniture this year. Sales to this outlet alone currently make up about 50% of total U.S. polyurethane volume, with a 60-65-million-lbs./year market in this field predicted by '64.

Other substantial markets: automotive uses, about 20 million lbs./year; mattresses and other bedding applications, now only a few million pounds yearly but expected to expand to 30 million lbs. by '64. And carpet underlay — another market that Reeves will aim for—is also expected to be a sizable polyurethane outlet.

In pushing flexible foams, Reeves will be joining the ranks of such producers as Nopco Chemical (Newark, N.J.), now building a second foam plant at Chattanooga, Tenn.; American Latex and Chemical (Hawthorne, Calif.), the West Coast's first producer; Urethane Corp. of California, now completing its Los Angeles plant; and U.S. Rubber, which produces urethane foam for automotive applications at Mishawaka, Ind. These are but a few of dozens of foam fabricators—some small, some large—that have leaped into this promising new field and are turning out both isocyanate- and polyether-based flexible-foam products.

It could be that Reeves—which also proclaims strong faith in another young polymer, polypropylene, for fiber uses—may be the factor needed to help open new markets for flexible foams. And Reeves could do much to make more likely the attainment of the long-predicted—but still only half achieved — 200-million-lbs./year polyurethane foams market.

New Setbacks in Africa

The political turmoil in Africa may result in a loss of mineral-rich lands to potential Western development. And, say on-the-scene observers, these lands could easily become fertile fields for Soviet bloc exploitation.

The possibility of a swing to the left can be seen in the Mali Federation breakup. With the dissolution of this political "marriage of convenience," land-locked Sudan will be forced to seek a new coastal outlet. One definite possibility: leftist-leaning Sekou Toure's Guinea. Sudan's possible hookup with Guinea would parallel the Congo's present leaning toward the Soviet orbit.

Another possibility arising from the African crisis: an indefinite delay in all major industrial development.

Bolder U.S. Aid Plan

In Bogota, Colombia, later this month, U.S. and Latin-American delegates will try to hammer out a broad hemispheric program of economic, social and political action that may well shape the course of U.S. business operations in Central and South America for a long time to come.

If the plan the delegates are expected to propose is ratified by their governments, it could spawn numerous new opportunities for U.S. companies to carry out chemical projects in Latin America within the next year or two—particularly for production of agricultural chemicals, e.g., fertilizers, feed additives, pesticides.

But the broader and deeper significance of this proposed program is that—if successful—it could greatly bolster the economic well-being of the entire Western Hemisphere, vastly improve relations between the U.S. and Latin America and bring into being a wholesome climate for business in the Latin-American market.

Essence of the projected new inter-American program, as touched on by delegates to last week's session of the Organization of American States at San Jose, Costa Rica: a profound shift in U.S. policies toward large-scale technical and financial aid for projects—such as agricultural reform and sanitation systems—that are most likely to bring speedy and substantial benefits to the general public in Latin America. In other words, U.S. experts on Latin America are now calling for the U.S. government to actively support the Latin-Americans' aspirations for a better life.

The new approach bodes many things for U.S. business interests. For one thing, the proposed public works could open new markets and investment opportunities for a long list of chemical products and processes. It could also mean an easing of U.S. import restrictions on Latin-American products. For example, officials have assured Mexico and Peru that higher tariffs on lead and zinc—if voted by Congress—will be vetoed.

Both Vice-President Nixon and Sen. John Kennedy are strongly in favor of this new approach. Thus, whichever candidate moves into the White House next January, the new line probably will be followed for the next four—or eight—years, at least.

COMPANIES

Flintkote Co. (New York) this week will carry out its proposed merger (*CW, July 9, p. 27*) with Diamond Portland Cement Co. (Middle Branch, O.) and also will acquire M. J. Grove Lime Co. (Frederick, Md.). Flintkote will issue 650,000 shares of $2.25 convertible preferred no-par value stock, with 300,000 shares going to shareholders of Diamond Portland, 100,800 for Grove. Anticipated increase in Flintkote's sales volume from the merger: $13 million/year.

•

Virginia-Carolina Chemical Corp. (Richmond, Va.) has sold its one-third interests in Gulfcoast Transit Co. and Mid-South Towing Co. (Mississippi River coal and phosphate haulers) to Peabody Coal Co. and Tampa Electric Co., its former partners in those companies. The price was listed as "several hundred thousand dollars in cash," the price of V-C's investment plus interest. Reason for sale: V-C was dissatisfied with the shippers' earnings since a recent reduction in Mississippi River freight rates.

•

Universal Fuel & Chemical Corp. (Pittsburgh) has purchased four companies: Boostair and Boostair Sales and Financial Corp. (Washington), manufacturers and distributors of cooling-air-control equipment; Polyvex, Inc. (Youngstown, O.), maker of extruded plastic shapes; and Shenango Plastic Co. (West Middlesex, Pa.), which makes molded plastic shapes. Purpose of merger is to give Universal a wider, more-diversified operation.

•

Cryogenics, Inc. (Washington, D.C.) is seeking Security & Exchange Commission registration of 236,000 shares of common stock, of which 175,000 shares would be offered to the public at $2/share. The new company intends to design and manufacture instruments and instrumentation systems for the handling and control of cryogenic materials. The majority of the stock sale proceeds would be used for working capital and to construct a research lab.

EXPANSION

Electrolytic Tin: Vulcan Materials' Vulcan Detinning Division (Sewaren, N.J.) will construct new plants at Houston and Los Angeles to produce electrolytic tin and high-yield steel scrap. Scheduled completion dates are early '61 at Houston and later in the year at Los Angeles.

•

Reflective Sheeting: Minnesota Mining and Manufacturing Co. (St. Paul) will expand its reflective products plant at Guin, Ala.—its third expansion there since late '55—by more than 80%. The 109,000-sq.ft. expansion, scheduled for spring '62 completion, will provide for expanded production of reflective sheeting and film.

•

Plastic Products: Scott Paper Co. (Chester, Pa.) will build a new plant at Eddystone, Pa., to produce plastic drinking cups (for hot beverages) and Scottfoam, a synthetic material used as a laminate with fabrics and as an air filter. The new plant will be built on a 63-acre tract bought from Sun Shipbuilding & Dry Dock Co. (Chester, Pa.) and will be financed through a sale and lease-back agreement with a financial institution. Total cost: $3 million.

•

Lime: Chemical Lime, Inc. (Brooksville, Fla.), recently organized supplier of quicklime and hydrated lime, will start operation next summer of its new, $2-million Brooksville plant, near Tampa. The new plant, with an initial capacity of 200 tons/day, is expected to increase total lime production in the state 500-600%.

FOREIGN

Polypropylene/Japan: Japan's Ministry of International Trade and Industry has finally granted tentative approval on the proposed licensing of Montecatini polypropylene technology by the Mitsui and Mitsubishi groups. This o.k. is still subject to the government's clearance on the over-all projects.

•

Catalyst/Netherlands: N. V. Transicol, Heyden Newport subsidiary producing paper size, is starting construction of a new plant to produce PMPH (*p*-menthane hydroperoxide), a catalyst made from dipentene and used to control the polymerization rate in the production of styrene-butadiene rubber (SBR). Location: the company's existing plant site at Geertruidenberg.

•

Chemicals/India: The Indian government has signed a contract with a consortium of West German chemical companies for construction of a $26-million chemical plant near Bombay. The plant, scheduled for operation in three to four years, will manufacture 40 semifinished products. Output will include dyes, varnishes, rubber auxiliary agents and pharmaceuticals to be made from toluene, benzene and naphthalene produced at three Indian coking plants. Net saving to India on foreign exchange: $6 million/year.

•

Petroleum Products/Australia: Vacuum Oil Co. Pty., Ltd., has invited four U.S. firms—Bechtel Corp. (San Francisco), Fluor Corp. (Los Angeles), and Foster Wheeler Corp. and Pullman's M. W. Kellogg (both of New York) to submit bids for construction by '62 of a $36-million oil refinery at Hallett's Cove, about 30 miles south of Adelaide.

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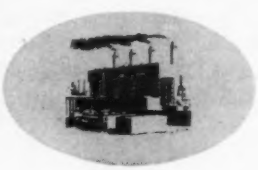

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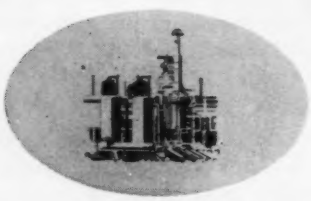

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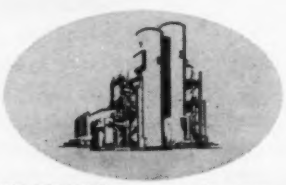

PAPER AND PULP

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Washington
Newsletter

CHEMICAL WEEK
September 3, 1960

A look at this Congress and the next, from the chemical industry viewpoint:

Antitrust: Sen. Kefauver's antitrust investigations will continue, still concentrating on the drug industry, possibly switching to others if a basic industry such as steel raises prices. Kefauver's probe of drug prices continues Sept. 7, with antibiotics (*CW, Aug. 27, p. 39*). The House investigation of regulatory agencies presumably will resume. Several agencies have not been touched yet, particularly the Civil Aeronautics Board.

Overseas profits: Conferees agreed on allowing payment of taxes on an over-all average instead of per-country basis. An act permitting deferral on profits reinvested overseas passed the House but died in Senate committee.

"Du Pont relief" bill: A measure reducing by 95% taxes that Du Pont stockholders must pay as a result of the General Motors divestiture is stymied in Senate.

Minimum wage: Senate-House conferees were hammering out a compromise close to the House version raising the minimum to $1.15 and extending coverage to 1.4 million retail workers.

Zinc and lead tariffs: Reduction of tariffs was o.k.'d by the Senate Finance Committee but not voted on by the Senate.

Water pollution: An increase in funds from $50 to $90 million a year for construction of treatment plants was vetoed by the President.

Air pollution: Congress directed Public Health Service to study the auto exhaust problem, report in two years.

Patents: A bill allowing contractors of the National Aeronautics and Space Administration to retain patent rights was passed by the House, but buried in Senate committee.

Color additives: Congress passed the bill allowing FDA to set tolerances.

Labeling household products: A requirement for warning labels on hazardous products was passed.

Price notification: Senate Antitrust Subcommittee held hearings on a proposal requiring basic industries to give notice of price hikes, allow public airing. But the committee did not approve the bill.

"Fair trade": House Rules Committee bottled up a federal "fair trade" law.

Tax benefits for self-employed: House passed but Senate buried tax benefits for retirement plans of self-employed.

Liberalized depreciation allowances: Although discussed, the bill was never passed by House Ways and Means Committee.

Foreign aid: Congress appropriated $3.7 billion, was preparing to authorize $500 million for Latin-American aid.

Premerger notification: The Senate Judiciary Committee never o.k.'d a bill requiring corporations to give notice of pending mergers.

Washington Newsletter

(Continued)

Depressed areas: Program for $250 million in federal loans and grants vetoed by President.

Alien property: Authorization for sale of General Aniline & Film shares held by U.S. government approved by Senate Judiciary Committee and House Commerce Committee, but not voted on by either House or Senate.

•

What the next Congress will do depends, of course, on who is President. But one item will be high in the priority of any Administration: a general overhaul of the tax structure. The House Ways and Means Committee has been holding exhaustive hearings and expects to report early next year. Since any tax reform raises cries of anguish from the special interests affected, the idea will be to present a package proposal that will make as many friends as enemies, result in a more equitable tax structure. Included would be revisions in depreciation allowances, personal income exemptions such as divided credits, closing of some loopholes such as oil depletion allowances.

•

The Justice Dept. has challenged West Virginia Pulp and Paper Co.'s acquisition last spring of controlling interest in U.S. Envelope Co.

In a civil antitrust suit filed in New York City, the government charged that the competitive position of both West Virginia and U.S. Envelope was enhanced as a result of the acquisition, and that potential competition between the two companies might be eliminated. The suit seeks to have West Virginia divest itself of its holdings in U.S. Envelope.

Robert Bicks, head of Justice's Antitrust Division, said the suit "springs directly" from a study of concentration in the paper industry conducted by the antitrusters.

West Virginia, headquartered in New York, had sales of about $233 million last year. U.S. Envelope, of Springfield, Mass., had sales of over $50 million in '59.

•

Industry could produce chemical-biological warfare products quickly if the need arose, concludes a staff study by the Senate Disarmament Subcommittee. U.S. industry has the capability to turn out "almost limitless" amounts of the warfare agents in widely scattered installations at low cost with short leadtime, the study shows.

For normal peacetime stockpiling purposes, however, the Chemical Corps' facilities at Edgewood, N. J., Pine Bluff, Ark., Denver and Newport, Ind., can handle the military's needs. Some 25 industrial firms have research contracts and supply several hundred products or formulas every month for screening and testing. (Last week the Chemical Corps unveiled to the press its latest arsenal of C-B weapons.)

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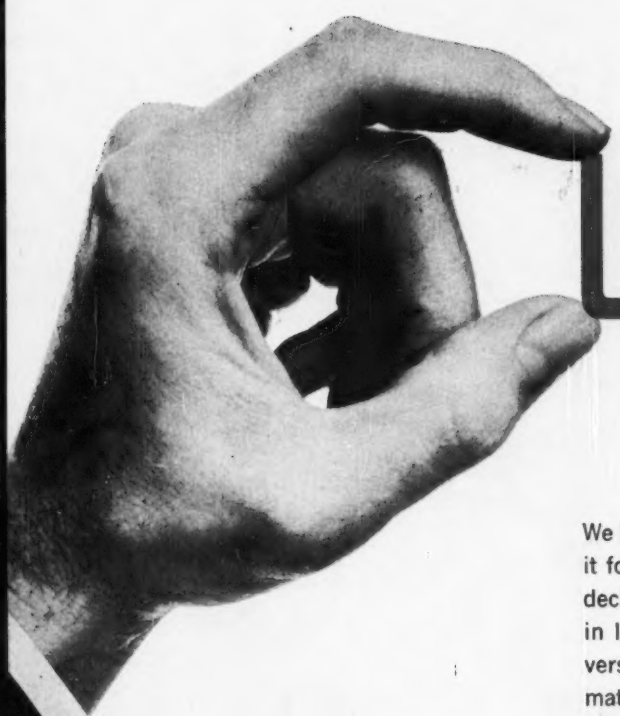

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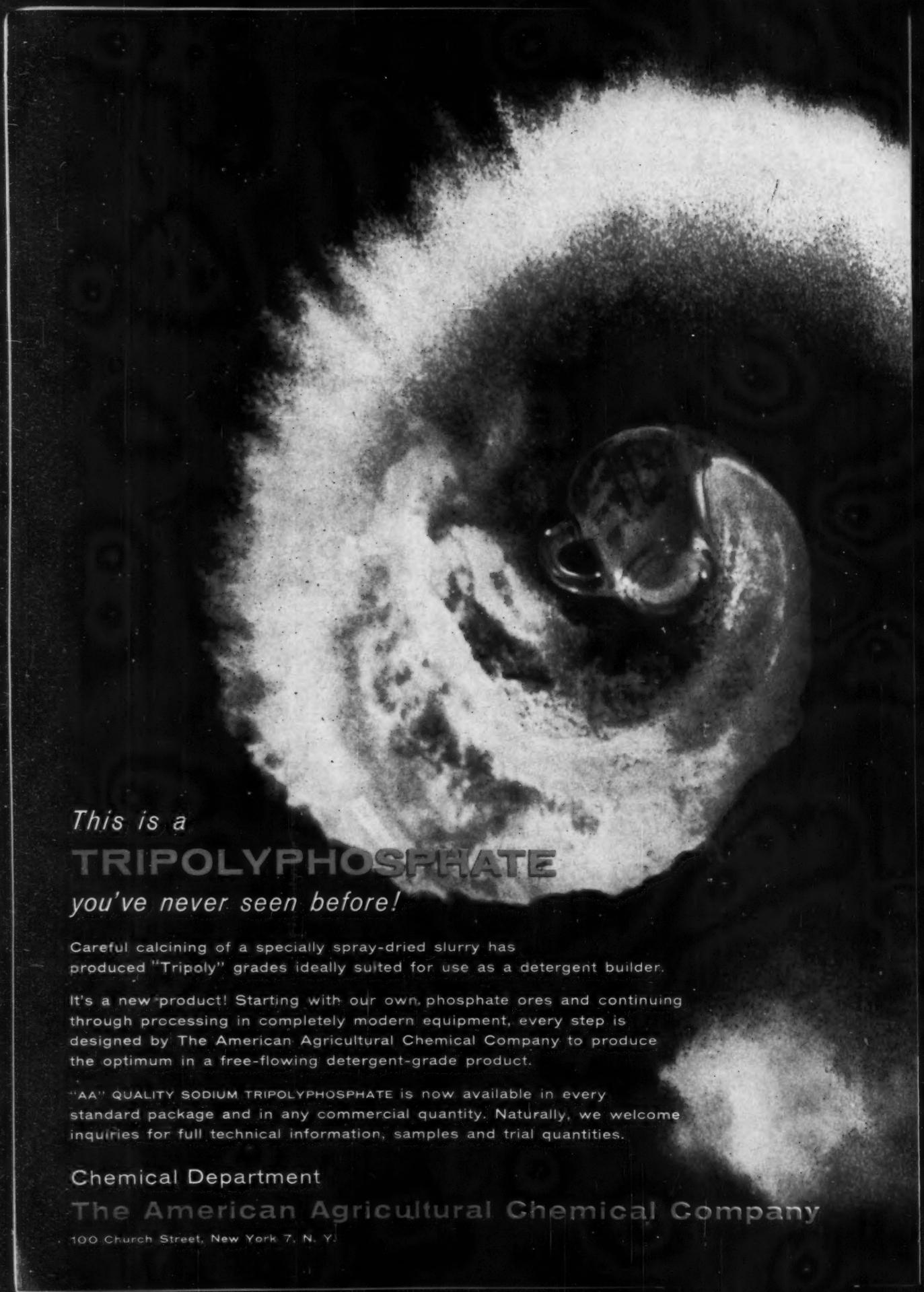
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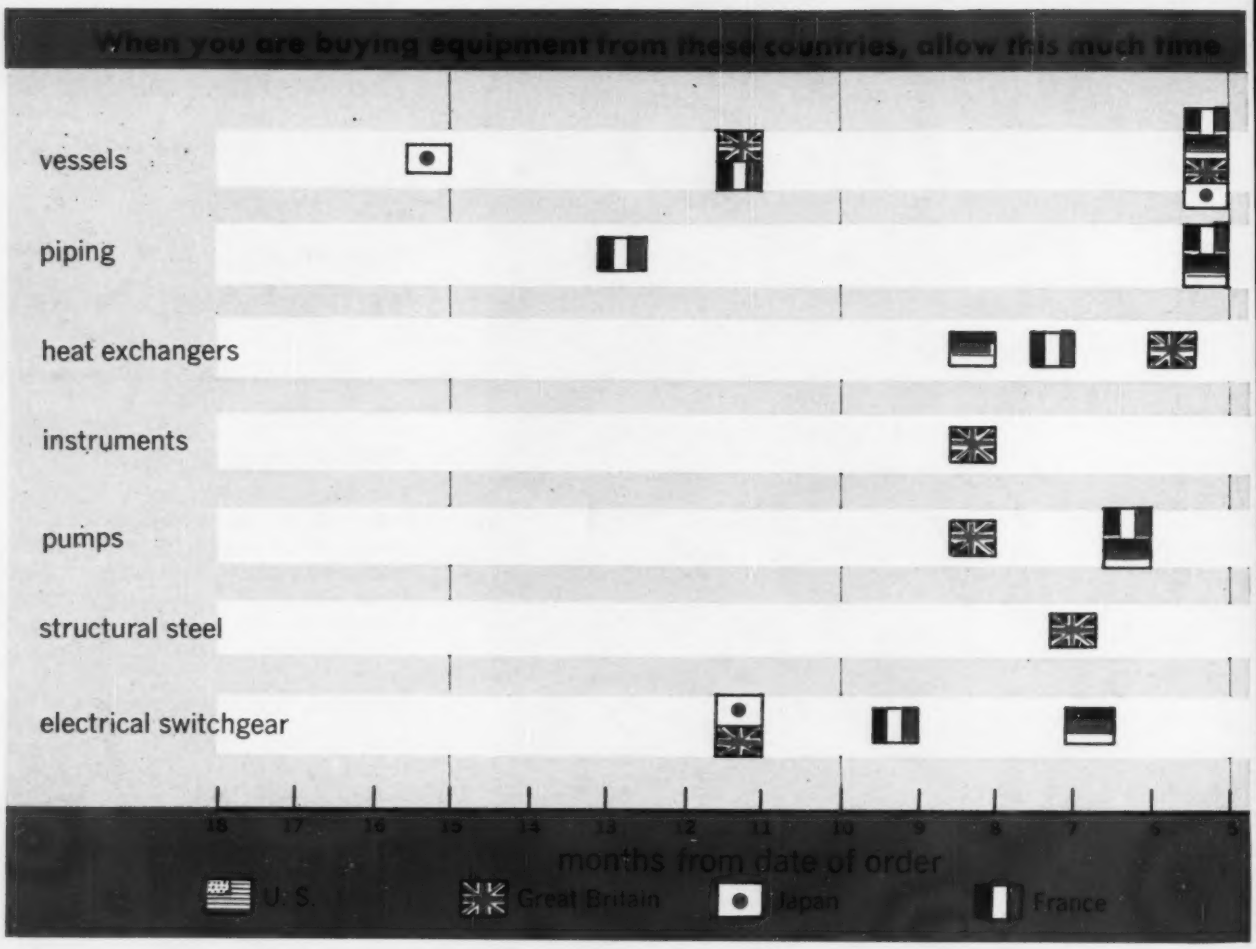


Buy Foreign Equipment for Your

The flags on the chart above give the latest word on time between placing an equipment order and subsequent delivery in five major countries. The chart shows that U.S. equipment makers still make quicker deliveries. But the U.S. edge is diminishing. For companies planning to build overseas this means that the odds are shifting in favor of foreign equipment purchases, which may be paid for in local currency—particularly important to companies with funds tied up by foreign currency restrictions.

And European manufacturers are gradually improving deliveries. Within a few years they may become competitive with U.S. producers on this score and put foreign project planning on an equal footing with construction at home. Of particular significance to U.S. companies:

• Manufacturing time for carbon steel distillation towers and tanks has generally improved in Europe. Two years ago delivery required eight to 12 months compared with five to seven months on current orders. U.S. deliveries have remained the same—about four to five months—over that period.

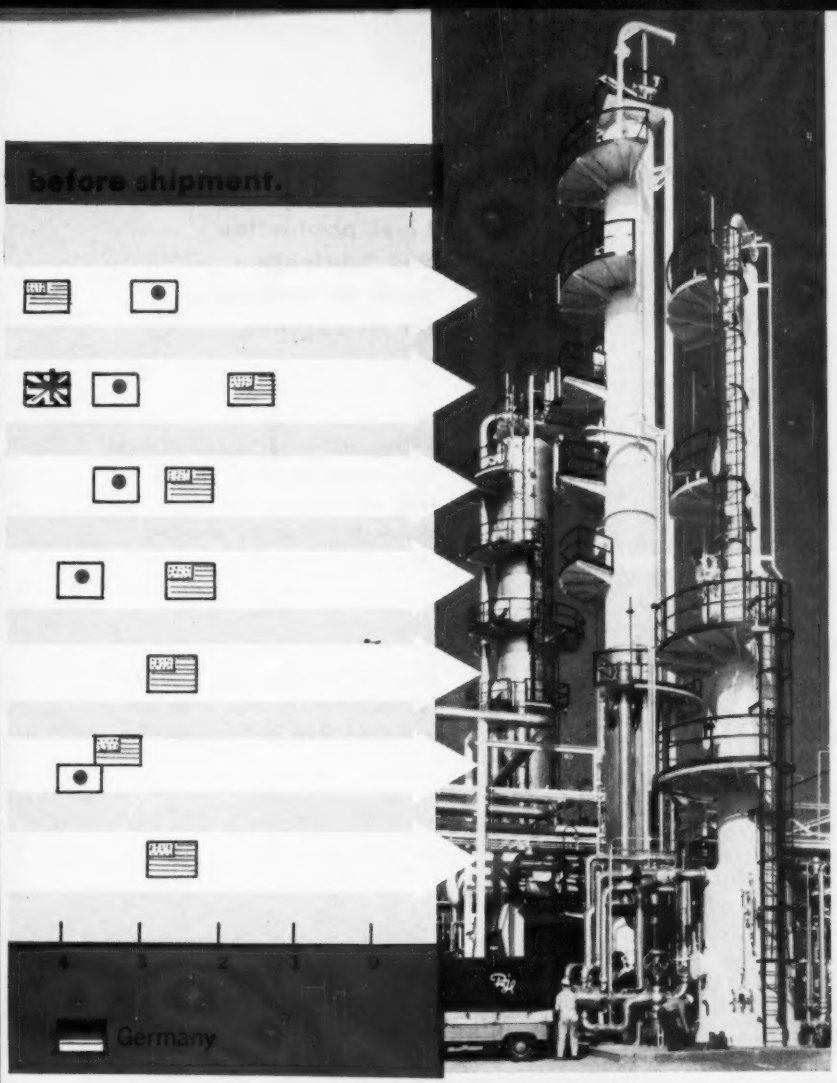
• While the lag-time for general piping has held relatively steady, Europe has greatly improved deliveries of alloy valves for this piping. Two years ago European project engineers had to allow up to 18 months for manufacture of alloy valves, whereas current project schedulers can count on a lag-time of six months or less.

• Heat exchanger deliveries have greatly improved. Two years ago a year's manufacturing time was required almost anywhere outside of the U.S. Today British manufacturers are turning out exchangers in five to seven months, while they can usually be obtained on the Continent in less than nine months.

• Foreign instrument manufacturers have cut their lag-time only slightly during the last few years; U.S. manufacturers hold a better competitive position because of much faster deliveries.

• Standard pump manufacturing times have been cut one to two months outside the U.S., but delivery of large compressors and turbines still requires about a year, compared with delivery in about six months in the U.S.

• Structural steel deliveries have been improved two to three months outside the U.S., but are still three



Overseas Plant?

to five months slower than deliveries in the U.S.

• While the bulk of electrical materials, such as conduit and grounding materials, have reasonably good delivery times all over the world, switchgear and large transformers remain one of the plant constructor's biggest headaches everywhere but in the U.S. and Germany. Project engineers have to allow about one year between the time they order and the date of shipment.

Big for Flexibility: Lag-time for steel plate, alloy valves and structural steel can be pegged to the number of producing units available in a country's heavy-metal industry. For example, steel plate of a specified thickness must be fitted into a mill's rolling schedule when the mill has enough orders to justify resetting its stands. Consequently, if a country has a large number of mills in operation, chances are a buyer would be able to find a mill that is rolling to his specifications.

This kind of flexibility depends on a country's business atmosphere as well as its over-all output. As long as business is slow, it takes time to build up the required volume of similar orders. On the other hand, if a manufacturer is already pushing his equipment to the limit, he will hesitate to shut down and reset his mills for a different specification.

Europe's long lag-times stem from both causes, date back to the close of World War II when output was low and the steel mills' production was overtaxed.

The improvement in lag-times has almost paralleled the rise in annual output of steel. For example, from '57 to '59, Japanese steel production jumped from 8 to 18 million tons, French went from 16 to 17 million, German from 27 to 29 million.

British production leveled off at 23-24 million and U.S. production dropped from 113 to 93 million. Today most British steel mills are scheduled on a quarterly basis, while the other countries' mills plan their programs according to orders.

Spot the Specialties: Since mills are scheduled to large orders, project engineers are alert to needs for special alloys in small amounts, such as valves, fittings and other small parts. Orders for these items might have to wait until the quantities needed are big enough to justify changing the mills.

Also, there's less flexibility in ordering vessels with walls over 3 in. thick. They are usually forged from oversize ingots, and only a few of the giant forging machines needed for these vessels are available—their outputs are scheduled 12-18 months in advance.

The Common Market-stimulated coordination of Europe's heavy industry pool will bring a drastic improvement in lag-time for its steel products. European resources will then match those of the U.S. and buyers will be able to cross national boundaries to find short deliveries when they need them. This is done to some extent today, but limiting national quotas forces purchasing engineers to juggle imports to fit the most urgent phase of their schedule.

Americans Abroad: American investment abroad is one cause of the radical improvement in heat exchanger deliveries. One of the first types of equipment produced in Europe under license to American firms, heat exchangers have been fabricated according to design drawings from Lummus, Foster Wheeler and Kellogg since about '50.

Currently Lummus and Foster Wheeler are operating European design offices as well. The net effect has been a gradual adaption to American methods of standardized design, parts stocking, and cataloging.

U.S. makers of pumps, compressors and distillation trays are follow-

ing the example set by heat exchangers, but with slower progress. They still do most of the design work in the U.S., limit European participation to fabrication according to imported drawings.

Over 50% of instruments used overseas are made according to American licenses or imported from the U.S. because of slow deliveries.

Europe's long lag-time for these instruments can be attributed to limited stocks, since European manufacturers, traditionally opposed to tying up capital in inventory, still refuse to manufacture even standard-size instruments without first getting customers' orders.

Lag-Time Scheduling: All this means that the design engineer operating outside of North America is subjected to illogical design procedures. Here, where material deliveries have always been good, plant design follows a traditional logical sequence. First, the process calculations establish the most economical route, temperatures, pressures and flowing quantities, then process specifications for equipment are prepared.

The project next enters the mechanical stage, when foundations, structures, vessels, piping, etc., are all designed and requisitioned. In conventional processes, the process and mechanical design work can be done in a matter of a few months and all the equipment is delivered to the job site in about eight or nine months.

This sequence is upset on foreign projects, however. Switchgear, heavy-walled vessels, and alloy valves must be ordered almost as soon as the decision is made to build. Since the switchgear depends on the electrical power consumption, and this in turn depends on pumps, instruments and lighting, ordering the switchgear is at best an educated guess—then the switchgear sets the size of associated conduits, switchgear housing, etc., so that the guess can easily snowball into poor design.

Compressors Dictate: The same is true for compressors and heavy-walled vessels. Since there is hardly time to study the most economical processing route before they must be ordered, the process and subsequent plant is frequently built around the compressors and major vessels.

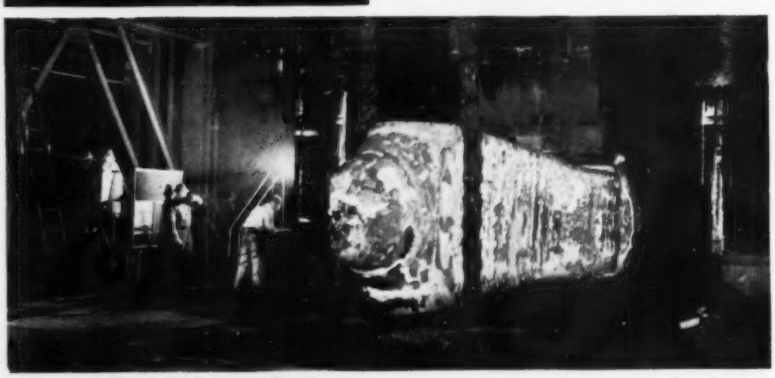
Alloy valves and oversize struc-

Why you wait for heavy equipment: steel production and fabrication must be scheduled far in advance

Rolling mills—like Grey mill (top) —must shut down to change roll sizes when dimensions of the structural shapes are changed.

Hours of welding time needed to fabricate vessels such as propane tank (left) must be provided for.

Work for giant forges (below) must be programed months in advance for economical operation.



Open-hearth furnaces, like Bethlehem Steel's furnace (left), collect orders for 150-200 tons of alloy before scheduling a 'heat.'

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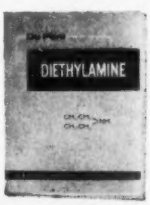

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tural steel have their worst effect on the construction schedules. Spotty, late deliveries prevent the crews from following a controlled pattern through the maze of pipe and steel that goes into a processing plant. They have to go back and forth as the material is delivered. With the thousands of connections required in a modern plant, this makes construction errors almost inevitable.

Close Watch: Data for the lag-time chart was collected from Badger Manufacturing Co., Blaw-Knox Co., and Chemical Construction Co. It was cross-checked and then compared with data from the American Arabian Oil Co., which regularly purchases from world markets.

Firms such as these with overseas experience have found various ways to overcome lag-time handicaps. Purchasing and expediting functions are emphasized, with expediters going directly into the mills to watch as the steel is smelted in the open hearth, tapped, cast into ingots, rolled and then shipped to the manufacturer. They calculate the manufacturing time from the number of welds or amount of machining required, taking into account speed and the number of welding passes or machine cuts. They watch the specification-tests imposed by the codes, and, finally, help arrange shipment to the job site.

Expediters have found that, in general, premium payments and friendly relations with the manufacturers can speed deliveries on the Continent. Lag-times quoted in Britain, however, can rarely be improved. On the other hand, they are not likely to fall behind.

A country-by-country comparison in the chart shows that Japan and Germany are improving their lag-times faster. Since both these countries are building up industries largely destroyed by World War II, their improvement indicates poor habits may be largely responsible for longer lag-times.

With them as an example, and with Common Market competition, U.S. equipment manufacturers should expect to find foreign firms closing the lag-time gap in the next five years. This can have a strong effect on exports, since experienced purchasing engineers say that prices for equal quality are essentially the same on world markets.

Nuclear Fission Cell

A new type of cesium cell converter that has produced 90 watts of electric power directly from nuclear fission is now undergoing operating tests by General Atomic Division, General Dynamics Corp. (San Diego, Calif.).

The cell, operated at about 3500 F, has over-all efficiency of about 10%; usual steam-generating electric power plants have efficiencies of about 35%. But the new cell has the advantages of nuclear fission as a heat source: compactness and potentially high efficiency. Although cost data is not yet available, the cell has possibilities of being a very attractive commercial power source about seven years from now—as indicated by research support from nine investor-owned utilities.

In the new cesium cell the nuclear fuel element is the emitter; a uranium carbide and zirconium carbide compound replaces copper, nickel or molybdenum usually used.

Nuclear fission causes electrons to boil out of the emitter. The electrons pass through an atmosphere of cesium vapor and are collected by an electric current collector surrounding the emitter. Part of the heat put into the hot emitter plate is converted directly into electrical energy.

The function of cesium is threefold: (1) it increases the rate at which electrons emerge from the emitting surface; (2) it reduces the energy loss at the cold collecting plate; (3) it becomes an ionized gas, or plasma, which enables the electrons to pass readily from the emitter to the collector.

In the test unit, the cesium cell is in an aluminum chamber that extends 12 ft. to the top of the reactor. As currently set up, the electricity output goes to an instrumented load at the reactor head.

Instruments show that the cell operates at a power density of 21 watts/sq. cm. The system appears capable of further efficiency when dimensions and temperatures are optimized. Also, it is expected that ultrahigh-temperature operation — in which efficiencies soar—will be practical; this will greatly enhance commercial feasibility. Cesium cells have generated a form of alternating current (*CW, Jan. 23, p. 65*) by experimental variations in the collecting plate's material and temperature, cell geometry, and cesium replacement by other metallic vapors.

Thermionic cells, such as this, require clean and very-high-temperature heat, which makes use of a nuclear source ideal, since it avoids the high-temperature material compatability problems of chemical heat sources.

Design studies show it may be possible to couple nuclear power sources to other types of external thermoelectric generators by taking advantage of the heat in waste gases. A cesium cell coupled with semiconductor equipment would increase the over-all efficiency of the heat-to-electricity conversion.

Another recent development in the move toward conversion of nuclear heat into electricity is the successful testing of a nuclear core designed for use in a compact power reactor. This progress, by Atomics International, division of North American Aviation, Inc. (Canoga Park, Calif.), together with the nuclear cesium cell, may well open new vistas to less-expensive power through lower investment costs, higher operating efficiencies.

PROCESSES

Organic Wastes: A reactor that completely destroys hazardous, highly chlorinated nonflammable substances, thus eliminates the need for burying them in bulk or in drums, has been developed by Hooker Chemical Corp. (Niagara Falls, N.Y.). Key: convert the organics to more readily disposable matter by subjecting them to high temperatures (900-1300 C). The brick-lined reactor is fired by gas for startup, but reaction is self-sustaining. Exit gases are cooled in a spray-tower, scrubbed to remove any acid components, and remaining inert gases are released through a stack. There is no appreciable solid residue.

•

Refined Vanadium: The purity and workability of vanadium metal are said to be improved markedly by a new electrorefining technique developed by the U.S. Bureau of Mines. Key to the process is an atmosphere of helium, which eliminates the two principal contaminants of vanadium —oxygen and nitrogen.

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INDOPOL Grade	Viscosity (S.S.U.)
L-10	114 @ 100° F.
L-50	516 "
L-100	1,040 "
H-25	255 @ 210° F.
H-35	375 "
H-50	540 "
H-100	1,070 "
H-300	3,000 "
H-1500	15,000 "
H-1900	20,500 "

Manufacturers of caulking compounds, mastics, adhesive compositions, electrical insulation and many other products, have a full line of Polybutenes to work with.

INDOPOL Polybutenes—a series of butene polymers—are available in ten viscosity grades for immediate shipment in drum or tank car quantities. This means that users of these products can get—from a single source—Polybutenes of excellent quality in unlimited quantity. They can select from the widest range of viscosities in the industry.

If you use Polybutenes, or if you would like to know how you might use them in the products you manufacture, ask for more information from your Amoco Chemicals representative or write for Bulletin No. 12.

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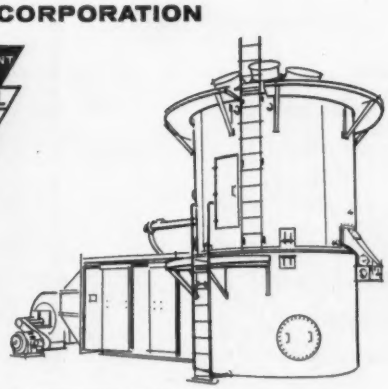


Louisville Process Equipment—Turbo-Mixers—Traylor Engineering—Fuller Company—Dracco
Sutorbilt—Kanigen®—Plate & Welding—Wiggins Conservation Structures—Field Erection

A new list of Soviet chemical plant and equipment orders placed in Western countries offers a stark commentary on the U.S. government's attempt to block technology from crossing the Iron Curtain.

The list, compiled by the German magazine *Die Chemische Industrie*, is incomplete but contrasts the amount of Soviet orders being placed in the U.S. and in Western Europe.

While the U.S. hasn't significantly changed its restrictive policy on selling potentially strategic materials and technology to the Soviet bloc since '58, our allies have been consistently easing up on sales to the Soviet Union and its satellites. So far the flare-up in the "cold war" doesn't seem to have made any difference.

The result: European suppliers have a decided edge in bidding for Soviet business, and they have been making the most of it.

In theory the Commerce Dept. will license a wide variety of technology. But in fact, Commerce turns down applications for licenses for much of the productive equipment that the Soviets want most for such items as fluorinated hydrocarbons, synthetic rubber, ethylene glycol, polyethylene, and many more.

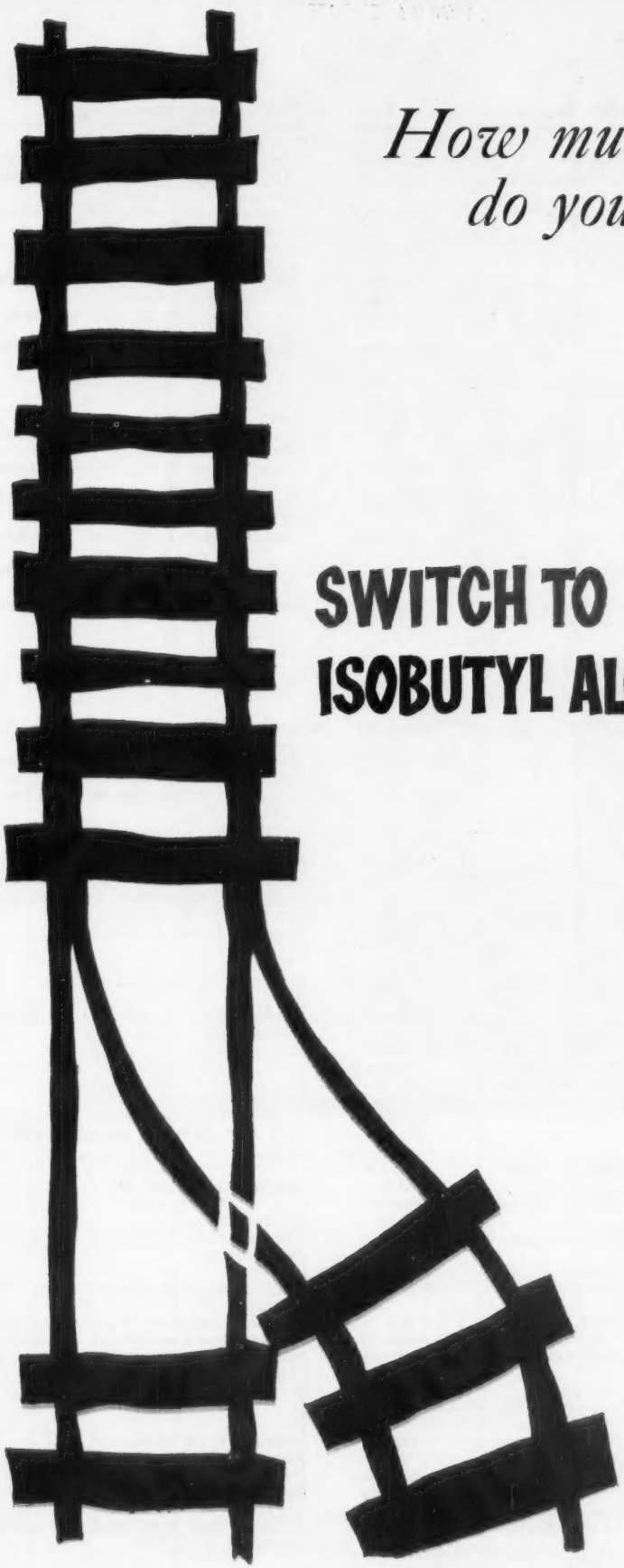
There is still considerable Soviet interest in U.S. processes, of course.

(*Text continued on p. 44*)

Shopping List for Soviet Buildup

Russian plant purchases

Project description	Capacity	Country	Remarks
For fiber production			
Polyacrylonitrile plant	15,000 tons/year	U.S.	Von Kohorn International
Cellulose acetate fabric plant	5,100 tons/year	U.K.	Courtaulds
Cellulose acetate fibers plant	18,000 tons/year	France	———
AH salt* and nylon 66 plant	10,000 tons/year	———	———
Viscose rayon plant	———	U.K.	Courtaulds
Viscose rayon plant	———	U.S.	Design, process, instructions.
Cellulose acetate yarn and fibers plant	20,000 tons/year	U.K.	Courtaulds
Cellulose acetate yarn and fibers plant		U.S.	Design, process, instructions.
Polyacrylonitrile staple fiber plant	———	U.K.	Courtaulds
Polyacrylonitrile staple fiber plant	———	U.S.	Design, process, instructions.
Tire-cord plant	50 tons/day	U.K. and Italy	Courtaulds, with assistance from Chatillon SpA Italiana per le Fibri Tessili Artificiale.
Polyester fibers plant	———	U.S.	Von Kohorn International
Polyester fibers plant	2,500 tons/year	Germany	Through trade agreement; valued at $5 million.
Synthetic fibers plant	———	U.K.	Vickers Armstrong and High Polymer and Petrochemical Engineering; valued at $6.16 million.
Synthetic fiber plant equipment	———	Japan	Through trade agreement.
Viscose staple fiber plant	———	U.S.	———
Viscose staple fiber plant	23,000 tons/year	U.S.	Von Kohorn International
Sulfate process cellulose plant	200,000 tons/year	Sweden	Mekaniska Verkstad.
Caprolactam from aniline plant	10,000 tons/year	Germany	Through trade agreement, '59 quota, '61 delivery.
Caprolactam from aniline plant	10,000 tons/year	Germany	Through trade agreement, '60 quota.
AH salt plant*	5,000-10,000 tons/year	Germany	Through trade agreement, '59 quota, '60 delivery.
Caprolactam extraction, evaporation distillation plant	———	Germany	Lurgi; through trade agreement, '59 quota.
Caprolactam continuous polymerization plant	12 tons/day	Germany	Two plants (6 tons/day each); through trade agreement, '59 quota, '60 delivery.
For plastics and resins production			
Polyvinyl chloride plant	35,000-40,000 tons/year	———	———
Polyester plant (for glass-fiber reinforced plastics)	5,000 tons/year	Germany	Through trade agreement, '59 quota.
Styrene and polystyrene plant	20,000 tons/year	U.K.	5,000-ton polystyrene plant ordered from P.G. Engineering and BX-Plastics; valued at $1.86 million.
Styrene and copolymers plant	5,000 tons/year	Germany	Through trade agreement, '59 quota.
Tatrafluorethylene plant	3,000 tons/year	———	———
High-pressure polyethylene equipment	24,000 tons/year	Germany	Salzgitter Industriebau GmbH.; through trade agreement, '60 quota.
Low-pressure polyethylene plant	24,000 tons/year	Germany	Through trade agreement, '60 quota.
Polypropylene plant	10,000 tons/year	Germany	Through trade agreement, '60 quota.
Polyvinyl pyrrolidone plant	180 tons/year	———	———
Melamine plant	10,000 tons/year	———	———
Cellulose acetate plastics plant	3,000 tons/year	U.K.	Industrial Plastics and East Anglia Plastics.



How much butyl alcohol do you use in a year?

The cost of many products and processes using butyl alcohol can be cut significantly through use of lower-priced Isobutyl Alcohol.

Obviously, the savings you obtain depends on your particular product or operation, but just to give you an idea of what can be done, look at the table below and estimate for yourself the cost reduction your company can realize in a single year by switching to Isobutyl Alcohol.

Eastman Isobutyl Alcohol costs 2½¢/pound less than the butyl derivative. This works out to a saving of $1,750 on a typical 10,000 gallon tank car. You take it from there.

SWITCH TO ISOBUTYL ALCOHOL AND SAVE

UP TO	IF YOU USE
$8,750	50,000 gallons
$17,500	100,000 gallons
$87,500	500,000 gallons
$175,000	1,000,000 gallons

Naturally, one of the questions you will want answered is: How will replacement of butyl alcohol with Isobutyl Alcohol affect your process or product? For general information bearing on the question, refer to our new booklet "Isobutyl Alcohol." It describes physical properties and performance characteristics of this economical solvent and reaction intermediate. For specific answers get in touch with the Eastman representative nearest you or write to our Customer Service Laboratory.

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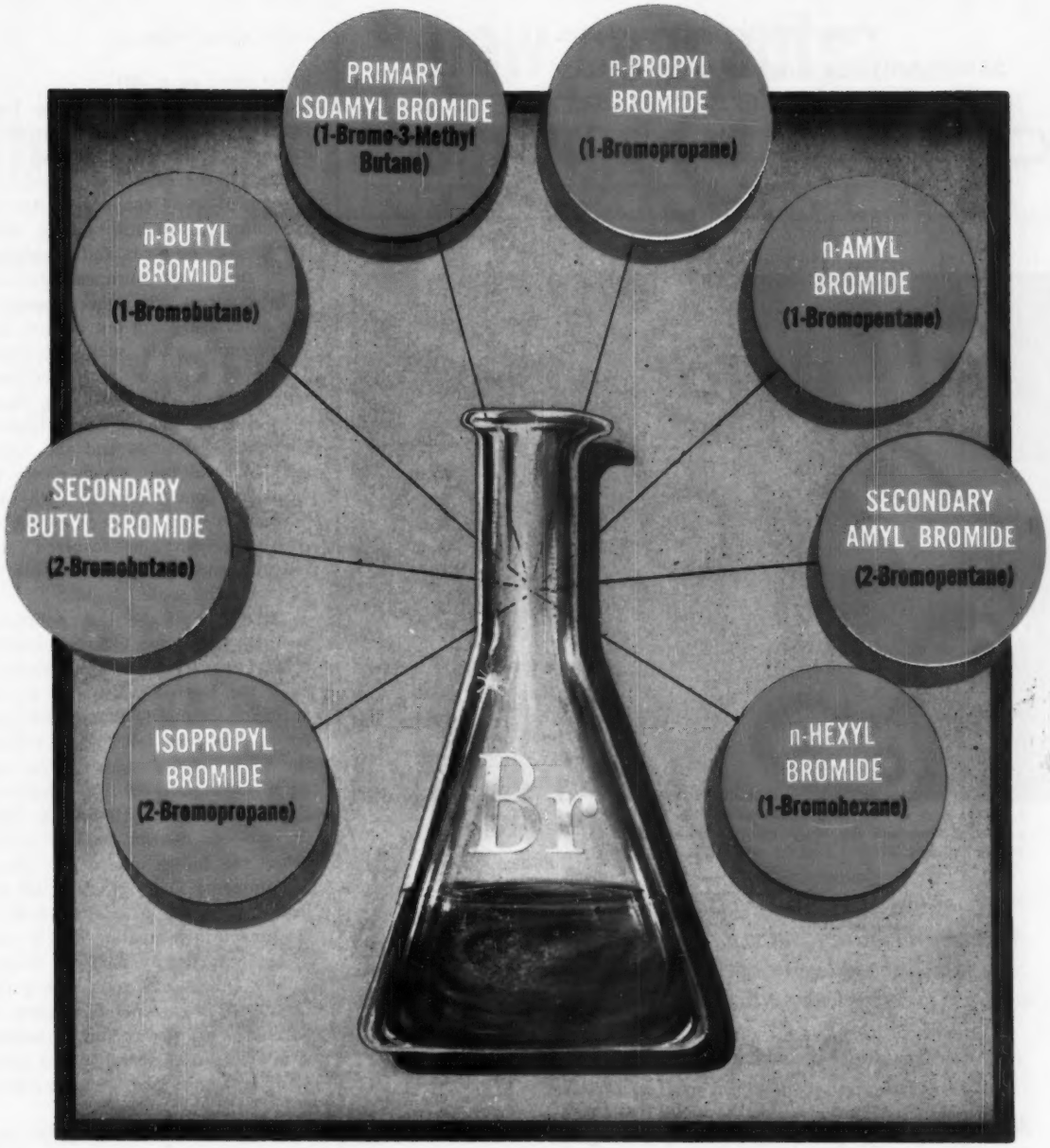
Styrene-foam plant	10,000 tons/year	?	Probably ordered in U.K.
Plastics foam plant	3,000 tons/year	Germany	Two plants; through trade agreement, '59 quota.
Polyvinyl chloride sheet plant	———	Germany	Through trade agreement, '60 quota.
Polyvinyl chloride cable production equipment	40,000kg/hour	Germany	Through trade agreement, '60 quota.
Polyethylene sheet and fittings production equipment	———	Germany	Through trade agreement, '59 quota; valued at $762,000.
Polyethylene sheet processing equipment	———	Germany	Through trade agreement, '60 quota; valued at $833,000.
Extruders for polyethylene pipe	———	Germany and France	Two units from Germany, '59 quota; one unit from France.
Polyethylene cloth-making plant	———	Germany	Two plants; through trade agreement; '60 quota.
Machine for coating metals with thermoplastics	———	Germany	Through trade agreement, '59 quota.
Plastic (including glass-fiber reinforced) pipe-making plant	———	———	———
Plastic pipe-making plant	———	U.S.	Omni Products Corp.
Polyvinyl pipe and fittings plant Pipe: Fittings:	12,000 tons/year 1,200 tons/year	?	Probably will be ordered from Sekisui Chemical Co. (Japan)
Molding machines for thermoplastics	———	Germany	Three units; through trade agreement, '59 quota.
Die-casting machines for plastics	———	Germany	Eight units; through trade agreement, '60 quota.
Hydraulic press (4,000-5,000 ton pressure) for plastics	———	Germany	Through trade agreement, '60 quota.
Finishing equipment for synthetic rubber plant	70,000 tons/year	U.K.	J. Dalgish, Glasgow; valued at $1.86 million.
Ceramic-coated equipment for polymer production	———	Germany	Through trade agreement, '59 quota.

For miscellaneous chemical production

Acetylene from natural gas plant	35,000 tons/year	Germany	BASF; through trade agreement, '60 quota, '61 delivery.
Acetylene from natural gas plant	———	Belgium	Etudes et Recherches Industrielles, equipment and know-how from Soc. Belge de l'Azote et des Produit Chimiques de Marly.
Acetylene and ethylene from natural gas plant	———	Italy	Montecatini; through trade agreement, '60 quota.
Ammonia synthesis plants	———	Belgium	Two units; Etudes et Recherches Industrielles, equipment and know-how from Soc. Belge de l'Azote et des Produit Chimiques de Marly.
Electrolytic chlorine and caustic plant	100,000-200,000 tons/year of caustic soda	France	Probably Krebs & Cie (France)
Synthetic glycerin plant	20,000 tons/year	———	———
Ethyl urea plant	1,000 tons/year	———	———
Phthalic anhydride plant	———	Germany	Through trade agreement, '59 quota, '60 delivery.
Maleic anhydride plant	———	Italy	Montecatini
Acetic anhydride plant	20,000 tons/year	France	———
Synthetic fatty alcohol equipment	5,000 tons/year	———	———
Fatty acid alkylamides equipment	5,000 tons/year	———	———
Detergents from petroleum-base plant	———	Germany	Through trade agreement, '59 quota.
Penicillin making plant	———	Austria	Grill & Grossmann; valued at $154,000.
Phosphoric acid plant	60,000 tons/year	France	———
Phosphoric acid plant	———	U.S.	Contract approved '60.
Titanium dioxide plant	20,000 tons/year	France	———
Titanium dioxide plant	———	Italy	Montecatini.
Equipment for production of highly dispersed Aerosil	5,000 tons/year	Germany	Through trade agreement, '60 quota, '61 delivery.
Spray dryers for detergents	———	France	———
Spray dryer for detergents	———	Germany	Lurgi; through trade agreement, '60 quota.
Spray dryer for Glauber's salt	5,000 lb./hour	U.K.	Kestner Evaporator & Enineering Co.
Crystallizer plant for Glauber's salt	40 tons/day	Germany	Through trade agreement, '59 quota.
Equipment for Glauber's salt production	20-40 tons/day	Germany	Six units; through trade agreement, '60 quota.
Sodium tripolyphosphate plant	———	———	———
Carbon black from liquid raw-materials plant	———	———	———
Carbon black plant	———	Japan	Through trade agreement.
Fertilizer plant	———	U.S.	Contract approved in '60.
Germanium processing plants	———	———	Two plants
Plant for pressure-sintering of lead concentrates	———	Germany	Lurgi
Fractionation unit for distillation plant	———	Germany	Through trade agreement, '59 quota; valued at $360,000.

* Adiponitrile-hexamethylenediamine salt (also called nylon salt).



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MISSISSIPPI LIME COMPANY
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INTERNATIONAL

(Text starts on p. 40)

For instance, the Commerce Dept. keeps turning down as a matter of routine all the requests that it receives for the export of polyethylene equipment and technology. But the Communists are still getting much of this equipment and know-how from our West European partners.

In contrast, the governments of our allies are going out of their way to promote trade with the Soviet Union in some of the same areas under ban by the U.S. The recent plastics exposition put on by Imperial Chemical Industries and the Japanese industrial fair, which closes this week, are good examples. Both Moscow shows were kicked off by officials of the governments involved. Both were designed for the specific purpose of promoting trade.

The result of the U.S. policy has been to discourage U.S. businessmen from even trying to win contracts from the Russians. Requests for export licenses during the second quarter of this year fell to $27 million, the lowest figure since a year ago. Approved exports for the period totaled $24.5 million, $10 million below the previous quarter, and $5 million below the fourth quarter of '59.

Commerce Dept. officials still rely heavily on U.S. chemical industry for advice in evaluating how a piece of technology may help the Soviets. Thus, the present restrictive policy reflects to a considerable extent the sentiments of the chemical industry, if not of the engineering and equipment companies that are more directly connected with such sales.

The Russians have shown no signs that they intend to let their political snarls interfere with the sweet words of their trade officials. In fact, they are talking in more grandiose terms than ever. Soviet planners have been throwing more weight on thinking in terms of an over-all "20-year plan." Assured sources of supply would ease such long-range planning—although it would be something of a revolution in Soviet economic thinking to admit trade considerations into long-term planning — taking them as other than a means for alleviating temporary shortages or surpluses.

Now the Russians are talking of 10- to 20-year trade pacts with Britain.

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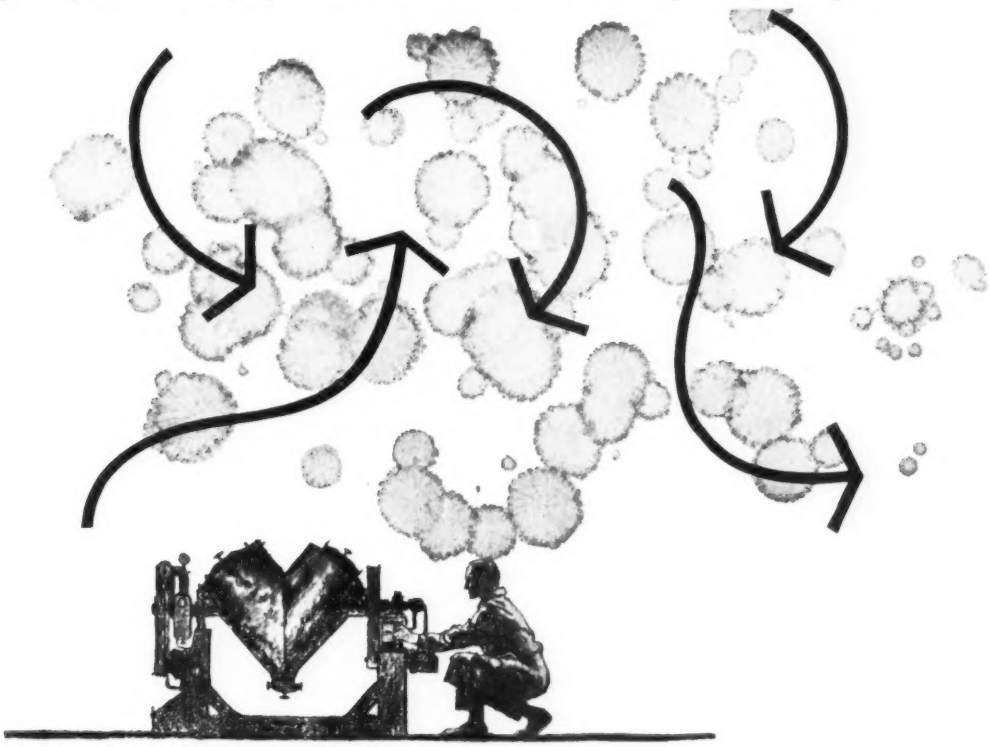

*Patented and Patents Pending

A production model of the new Solids Processor is available for testing at our Pre-Test Laboratory. Standard, intensifier and liquid-solids "Twin Shell" Blenders* are also available . . . as are packaged vacuum tumble dryers (conical type) and ribbon blenders. » » » The P-K Pre-Test Laboratory provides accurate predictions on savings, scale-up and operational procedures. We invite you to take full advantage of its facilities—either by bringing or sending your materials. To make arrangements, write or call George Sweitzer at East Stroudsburg. To call direct dial 717-Hamilton 1-7500. » » » A new P-K Solids-Process Catalog #16-P is now available.

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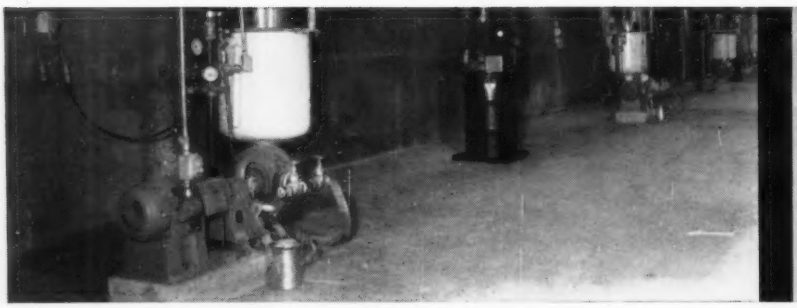
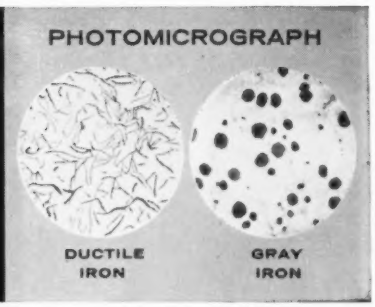
PUMPAGE

Goulds news about pumps for process industries





Glassed pump keeps tattletale gray out of light bulbs

Sylvania Electric Products Co. uses an abrasive slurry of hard fine phosphor particles in a xylol solution to coat the inside of its fluorescent tubes.

This slurry has always been hard to handle. It quickly eroded metal pumps which then contaminated and discolored the slurry. Discoloration increased rejects. A pneumatic system was tried . . . it needed constant monitoring and created a vapor hazard.

Sylvania engineers installed a Goulds-Pfaudler test pump, estimating a nine-month life would pay for the pump. *Over two years later*, the pump shows no wear or foreseeable future problems.

Sylvania now has four Goulds-Pfaudler glassed pumps, each running about 80 hours per week and handling 30 gpm of slurry against a 30-ft. head.

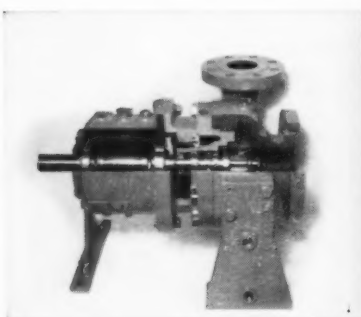
This simple, completely enclosed system ends vapor hazard, involved pipes and controls, and the need for constant monitoring. The inert glass protects product purity.

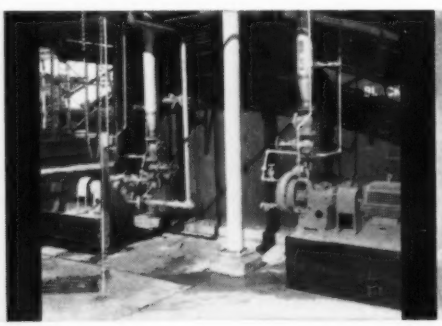
The ductile iron difference

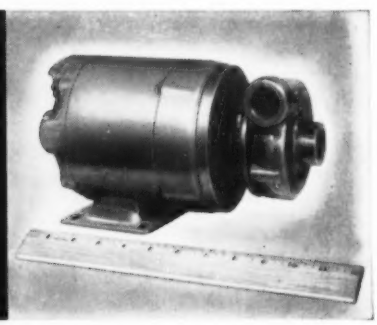
To make ductile iron, magnesium is added to molten cast iron, changing the sharp, thin graphite flakes to spheroids. The spheroids have large areas of iron matrix between them, and since they have no sharp edges, the ductile iron has far greater strength than the original cast iron.

Ductile iron is so tough it can be used in many applications previously requiring cast steel.

It might pay you to look into this. Write us for information on ductile iron pumps or parts.







Pump with cold feet

The Goulds Model 3775, available in steel and any of the stainlesses, handles temperatures to 600° F because of its cooled support, bearing and seal chamber construction.

It is ideal for handling flammable or otherwise dangerous liquids, withstands thermal shock.

For information on this, or other products on this page, write Goulds Pumps, Inc., Dept. W-90, Seneca Falls, N. Y.

Vicious viscous kept moving

Over 100 Goulds pumps do a wide variety of pumping jobs at Marathon Southern Corporation.

Among them are two tough 3715's. These keep abrasive, viscous black liquor moving. Each handles 200 gpm to a head of 65 ft. Stainless steel 316 construction resists the bite of hot, abrasive liquor.

Choose construction materials best suited for you when you get the Model 3715. Write for Bulletin 725.4 which lists available materials.

Now...circulate with Hastelloy "C"

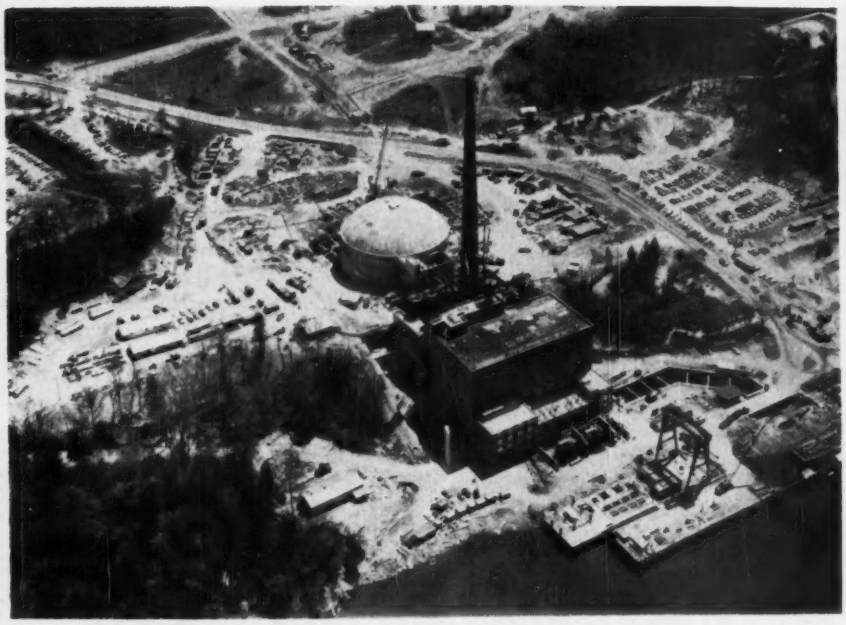
If you need a small pump in a hurry to circulate or transfer clear corrosives—we can supply it right off the shelf.

Hastelloy* "C," a highly corrosion-resistant nickel-chrome-molybdenum alloy, is now available on our Model 3604. This $\frac{3}{4}$" centrifugal pump with big-pump stamina is built for 'round-the-clock service in chemical process work, pilot plant or laboratory.

Drop us a line and we will send you a bulletin with performance chart and other information.

*Trademark of the Haynes-Stellite Division of Union Carbide Corp.

GOULDS PUMPS



Con Ed's atomic plant: community relations laid the foundations.

How Atom Users Woo Favor

This Monday (Aug. 29), in Washington, D.C., a "Task Force on Public Understanding of Atomic Energy" will hold its first meeting to find ways for business and industry to step up their campaigns against public ignorance about radiation and radioactive materials. Goal of the task force, arm of the U.S. Chamber of Commerce's Committee on Commercial Uses of Atomic Energy, reflects industry's worry that increasing criticism will hamper use of radioactive materials.

A number of recent events indicate heightened public concern about radiation.

• In Boston, wide publicity is being given the current investigation of a dockside explosion near a dozen large cement cylinders of atomic waste awaiting disposal at sea. A decision is pending on whether or not to curtail atomic waste disposal from Boston Harbor.

• The provincial government of Ontario, Can., last week said that it would commence control of unmarked U.S. trucks carrying radioactive materials. Citizens and fire companies have complained that residents could be exposed to serious risk if unmarked trucks were to catch fire.

• A movie company reported that it will produce a film entitled "Poison in Our Land," based on the alleged radiation exposure of much-publicized Jackson McVey. McVey was employed at W. M. Kellogg's now-closed radiation laboratory in Houston, Tex., when a radioactive pellet disintegrated and contaminated an area in the plant in '57.

• Several states and regional agencies have formulated disaster plans to be used in the event of radiation accidents.

Formless, Feeling: Checks with management of chemical process firms that deal in radioactive materials, whether they make atomic bomb components or use tracer elements, indicate that an effective educational program is difficult to set up because the fears that must be overcome are complex, often formless and based largely on feeling.

Compounding this is the lack of discrimination by both the informed and uninformed alike in dealing with the nomenclature and concepts of atomics. As a result, management points out, the public tends to lump in one vague package a gamut of problems ranging from atomic bomb explosions to the possible hazards of X-ray machines at the shoe store.

Nor does the variety of agencies and interests involved help in creating public understanding. At one extreme: secretive government bureaus, exemplified by the Atomic Energy Commission, which has a tremendous amount of influence over radioactive materials and their manufacture or use.

At the other extreme are the public utilities seeking to use atomic energy for the generation of electricity. As a group, they're ranged against governmental power development and they tend to fear and fight the incursions of officialdom, even into the area of public education. Between these two extremes lie the many other firms that use or make radioactive materials, from watch-dial manufacturers to pipeline companies that use radioisotopes for finding leaks, measuring flows.

Problem Measure: But if the causes of "nuclear nuerosis," as one manager terms it, are difficult to pin down, it's even harder to put a measure to so-called public ignorance. Until recently no major steps had been taken.

Now, however, at least one company thinks it may have some leads. General Electric Co., with the help of a Philadelphia research organization, has just completed a nationwide survey of public knowledge and opinions about radiation-connected activities. GE cautions that final compilations are not yet made, nor have all the findings been interpreted; the company hopes to have these by late September. Nevertheless, some idea of what future educational programs may try to do may be inferred from some of the survey's findings so far (*see table, p. 50*). It's pretty clear from these findings that in the public's view the business and industrial communicators have done little to help the public understand atomic energy.

What's Done: Some things, of course, are being done to inform the public about radiation, but shots are scattered, targets aren't clearly defined. So far the effort to inform the public breaks roughly into three phases:

(1) Long-range, continuing public

Questions and Answers for the Atomic Age

Early findings from a nationwide survey*

1. What groups do you think know quite a bit about atomic energy?

Answers	Percent of Respondents
Scientific	93
Military	80
Congressional, governmental	60
Public utilities	56
Prominent educators	45

2. If you were interested, where would you turn for more information?

Medical people	45
Local, city, state government	30
Businessmen	23
Labor unions	12
Clergy	9

3. Where would you like to see stories and articles?

Newspapers	52
Magazines	44
Television	17
Other sources	12

4. Where would you look for more information?

Library	22
Government agency	19
Educational institution	14
Textbooks	9
Private industry	8
Atomic Energy Commission	7
Magazines	6
Newspapers	5
Undefined reading	5
Broadcasts (TV and radio)	1
Civil defense officials	1
All others	1
Didn't know	21

5. Do you recall seeing, hearing or reading something on atomic energy recently?

Yes	63

6. If so, where?

Newspaper	54
Television	18
Magazine	20
Radio	7
Books and pamphlets	3
Word-of-mouth	4
Motion picture	1
Educational institution	2
Can't recall	11

* Source: General Electric Co.

relations programs to broadcast background information via such media as cartoons, comic books, brochures, motion pictures, speakers' bureaus, press releases and news stories.

(2) One-shot, special undertakings designed specifically to serve a particular purpose such as announcing a special event or clarifying a situation. Very often such an undertaking later becomes a permanent feature of the long-range program.

(3) Emergency action, when something goes wrong, to help prevent panic.

By and large, management thinks that any comprehensive public relations program should contain all three of these elements. They name outstanding examples of each.

Long Range: Near Indian Point, N.Y., just north of New York City, Consolidated Edison Co. is building a pressurized water, thorium-uranium converter reactor. The company was the first in the U.S. to announce definite plans for building its own atomic power plant, did so within six months of the '54 Atomic Energy Act permitting private development. AEC permission to build was received in May '56. The plant is on schedule, is expected to go onstream in '61.

Con Ed's atomic information program began in '54, based on two policy decisions. First the company decided that it would consider a reactor as merely another addition to the system plant. Second it would finance the operation without government help. These two decisions meant that public relations would be handled as a routine function, and the story would be told from a private, free-enterprise viewpoint.

First the company published an advertisement in Aug. '54 that it was interested in atomic power. In October, it announced acquisition of the site at Indian Point. A check showed favorable public reaction. The public lauded the company's vision, Westchesterites were happy to see new tax ratables. Gradually, company management started to make nuclear energy a topic of their speeches.

Next step was the production of a series of three booklets in easy-to-read language describing the atomic field. All three were entirely noncommercial, were used in the New York school system.

In March '55, the company stated that it had applied to AEC for a construction permit. From time to time thereafter occasional press releases were issued as newsworthy items developed. In addition company executives began to grant interviews to magazine and newspaper reporters.

In May '56, AEC permission—the first ever issued for such a project—was granted, and the information staff turned out a roundup story on the plant. A speaker's bureau was set up; the company sponsored a one-day institute for teachers and students. An added fillip was the construction of an exhibit and observation building at the project site. And film segments of construction were made into a 12-minute documentary film.

Con Ed reports that in the five years its program has been under way it has detected no major or organized opposition to the plant. It thinks that consistent, yet varied, presentation of its ideas and goals, has satisfied people's interest in what's going on.

One-Shot Special: A second form of public relations undertaking is the specific job tailored to meet particular conditions. When Union Carbide decided it would build its Nuclear and Ore Research Center in Sterling Forest, near Tuxedo, N.Y., it began to map its campaign six months before announcing its intention to build.

In meetings with the New York State Dept. of Commerce, Carbide community relations experts studied Orange County, where the center would be. One important point: Sterling Forest had a long history in mining, and uranium was one of the ore bodies. Indeed, rumors were already circulating that some company was going to start mining for uranium in the region. By January, Carbide had been in touch with many state and local officials and had spoken to leaders in the county. These investigators uncovered four key points to be made at the time of the announcement:

(1) Carbide would not do any mining in Orange County.

(2) The operation was strictly for research, not production.

(3) There could be no chance of a nuclear explosion, nor pollution by radiation.

(4) There would be a positive economic impact on the area.

Two weeks prior to the announcement Carbide scheduled a meeting

IN YOUR IMPROVED PRODUCTS . . .

Jefferson Propylene Glycol and Dipropylene Glycol go to a picnic

Makes you wonder how they used to have picnics. This current American pastime is filled with your practical applications for Jefferson Propylene Glycol and Dipropylene Glycol . . . reinforced plastics of the boat and water skis, sun tan lotion, flavoring in the soft drinks and food, brake fluids, printing ink, plastic tablecloth, cigarettes, beverage cooler insulation, and insecticide.

The very low toxicity of propylene glycol leads to its wide usage in foods, pharmaceuticals, and cosmetics. Dipropylene glycol is superior as a coupling agent or mutual solvent for normally immiscible liquids. It is most useful where a glycol of lower volatility and hygroscopicity is required. Both glycols are now available from Jefferson in the grades and quantity desired . . . tank cars or wagons, or 55-gallon drums. For complete information or technical services, write to Jefferson Chemical Company, 1121 Walker Avenue, P. O. Box 303, Houston 1, Texas.

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003

with commisioners and department representatives from the state of New York at which complete drawings and specifications of the project were made available and all questions answered. Following that, Carbide arranged for a "town meeting," sponsored by a local civic association, to be held two days after the formal announcement. The debut had been timed to meet the publication dates of the county's important papers. The press release accompanying the announcement was designed to answer the questions that arose in the preliminary survey.

The town meeting was attended by Carbide Nuclear Co. top management and qualified men answered all questions about the center's operations and design, backed up by models, exhibits and a motion picture.

In this and subsequent community meetings in the area Carbide believes it achieved several goals:

- Local sponsorship contributed to broad local interest.
- Meetings were attended by community opinion molders.
- Town meeting atmosphere encouraged questions from the floor and a participative attitude.
- Carbide speakers had the opportunity to let the public know something of the company.

Ground breaking brought the special campaign to an end. Since then, activities have been part of the overall public relations program.

Emergency: In April, when a fuel element ruptured in Westinghouse's Waltz Mill, Pa., water-cooled test reactor, public relations men moved quickly. The situation was conducive to the spread of wild rumors: the hour was 8:40 p.m. Sunday—not a usual business hour—and personnel had been quickly "scrammed" from the plant. Moreover, some contaminated water got into a high water tank and the subsequent radiation "shine" caused monitoring alarms all over the plant to go off.

As soon as a reasonable surmise could be made as to the source of the problem, and checks of monitoring devices within a mile radius of the plant showed no increase in radiation, management called central public relations people in Pittsburgh. Together, they worked out a statement saying that "an increase in fission products was probably caused by a fuel element rupture . . . with radiation confined to the operating areas. No damage or injuries resulted." The release was phoned or taken to local news media and wire services early Monday morning. Although the incident got wide notice, no wild rumors or speculative articles appeared. Westinghouse believes that swift action in stating and explaining the incident averted adverse publicity.

At the community level, Westinghouse local management told its story via employees and friends and neighbors. Shortly after the incident, workers were needed for cleanup work around the plant, and management recruited them from nearby Yukon, Pa. These people were able to see for themselves, and report to the community, that no visible damage had occurred at the plant. Meanwhile, plant personnel made personal visits to those local residents who seemed to want more detailed explanations, and to community leaders.

Outlook: Such examples of public-community relations and education with respect to radioactive materials indicate that management has already stored up a considerable fund of experience. Nevertheless, it's a sure bet that before long, process management will be called upon to redouble efforts to convince the public that radiation can play an increasingly important—and safe—role in their lives.

La Porte Gas Inquiry

An inquiry into the recent gas scare in La Porte, Tex., produced testimony by Dr. Walter Quebedeaux, chief of Harris County's air- and stream-pollution office, that the gas was phosgene from S&W Chemical Co., a division of Delmar Chemical Co.

Two weeks ago a mysterious gas temporarily felled citizens in the street, causing them to retch and have headaches (*CW, Aug. 27, p. 78*).

Although S&W denied it had any leaks or had caused trouble, Quebedeaux recommended several antipollution devices he thought the plant needed. Harris County officials are studying testimony from the inquiry to see if any court action should be taken. Delmar President James Waters told the court his company wanted to cooperate, but felt it should be allowed to produce witnesses and cross-examine, both of which actions the court had earlier denied.

LABOR

Riverside Pact: Riverside Chemical Corp. management at Tonawanda, N.Y., and Local 15-375, Oil, Chemical & Atomic Workers Union, have come to terms on a two-year contract calling for a 13¢/hour wage increase in the first year and an 8¢/-hour increase in the second. Other provisions call for liberalization in health insurance, vacation benefits, and paid funeral leave. Employees were guaranteed a 42½-hour week.

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OCAW Bargaining: Oil, Chemical & Atomic Workers reports it has won 16 organizing elections and lost six during this summer's campaigns. While two of the elections were in resistance to "raids by other unions," the remainder added about 1,800 members to OCAW. Nevertheless, union leaders say, total membership of the union is fairly static because the modernization of plants and equipment requires the hiring of fewer replacements for employees who quit or retire.

The union lists several key organizing projects now under way. They include Shell Chemical Co. at Torrance, Calif.; Homestake-Sapin and Home-Stake Mining, both near Grants, N.M.; Bureau of Mines helium plants at Shiprock, N.M., and Keyes, Okla.; Eastern States Refining, Houston, Tex.; Allied Chemical, Bessemer, Ala.; Union Carbide, Charleston, W. Va.; Tidewater Refinery, Delaware City, Del.; Mobil Refinery, Buffalo, N.Y.; Chemical Industries, Ltd., Brownsburgh, Que.

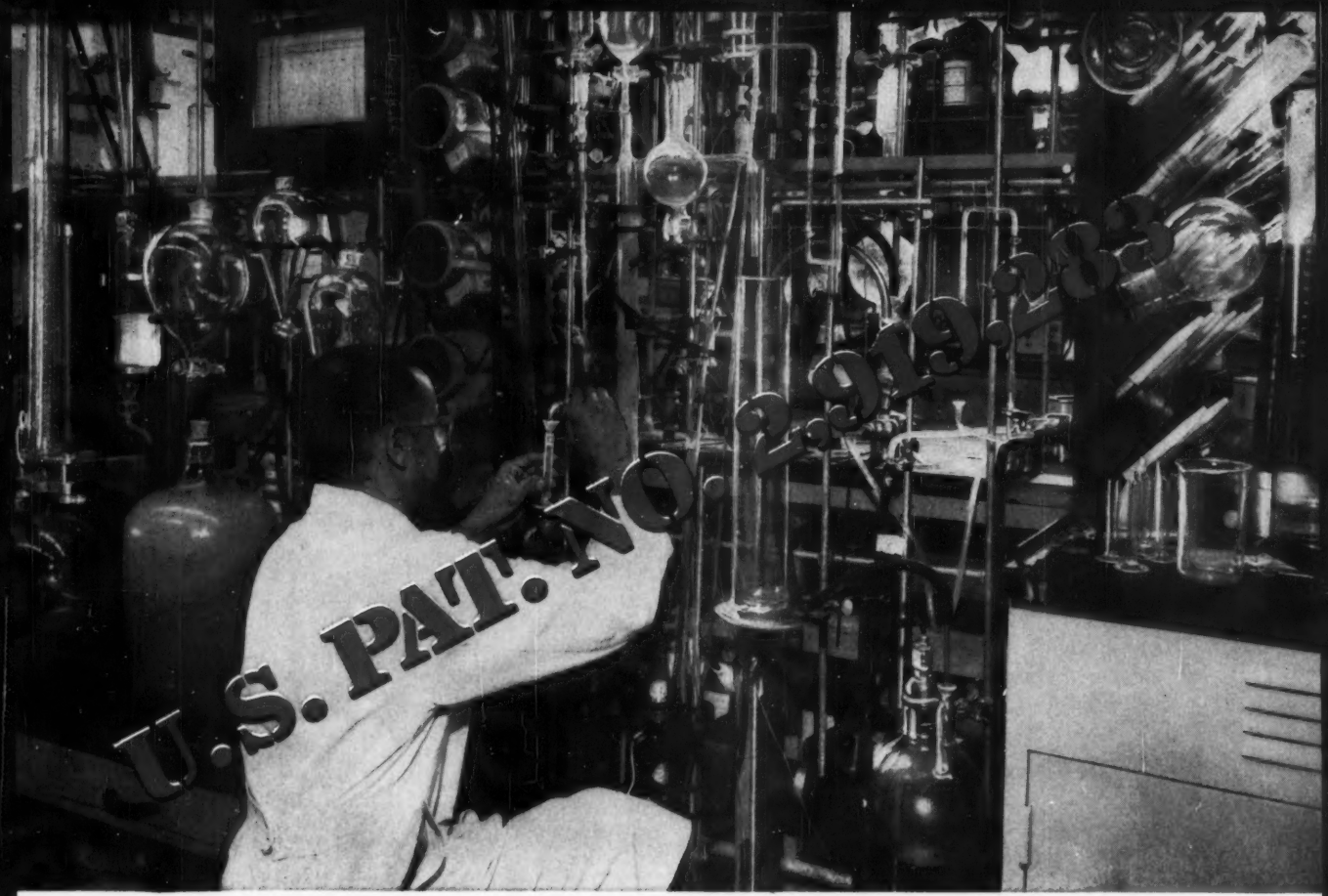
KEY CHANGES

Hunter Woods to president, Rigo Chemical Co. (Nashville, Tenn.).

Robert R. White to vice-president, general manager, research and development, The Atlantic Refining Co.

Wayne E. Edwards to vice-president, manufacturing and research, The Allen B. Wrisley Co., subsidiary of Purex Corp., Ltd. (South Gate, Calif.).

Leroy S. Meckley to vice-president, manufacturing, **Warren F. Schumacher** to vice-president, sales, J. T. Baker Chemical Co. (Phillipsburg, N.J.).



Becco Granted Patent On In-Situ Epoxidation Using Ion-Exchange Resins as Catalyst

Becco Chemical Division, Food Machinery and Chemical Corporation, has been granted U.S. Patent No. 2,919,283, covering in-situ epoxidation using ion-exchange resins as the catalyst. The process is an extremely practical and valuable one. As evidence, consider that millions of pounds of epoxy plasticizer have already been produced, using this method, by prominent companies in the industry. Issuance of this patent is additional evidence of Becco's leadership in the field of epoxidation. (A license to use this process is offered to you by Becco; write for details.)

If **you** have an interest in this area, perhaps Becco's experienced Sales Engineers and research chemists can help you. Write us, outlining your problem. Complete confidence, of course. Address: Department CW-4

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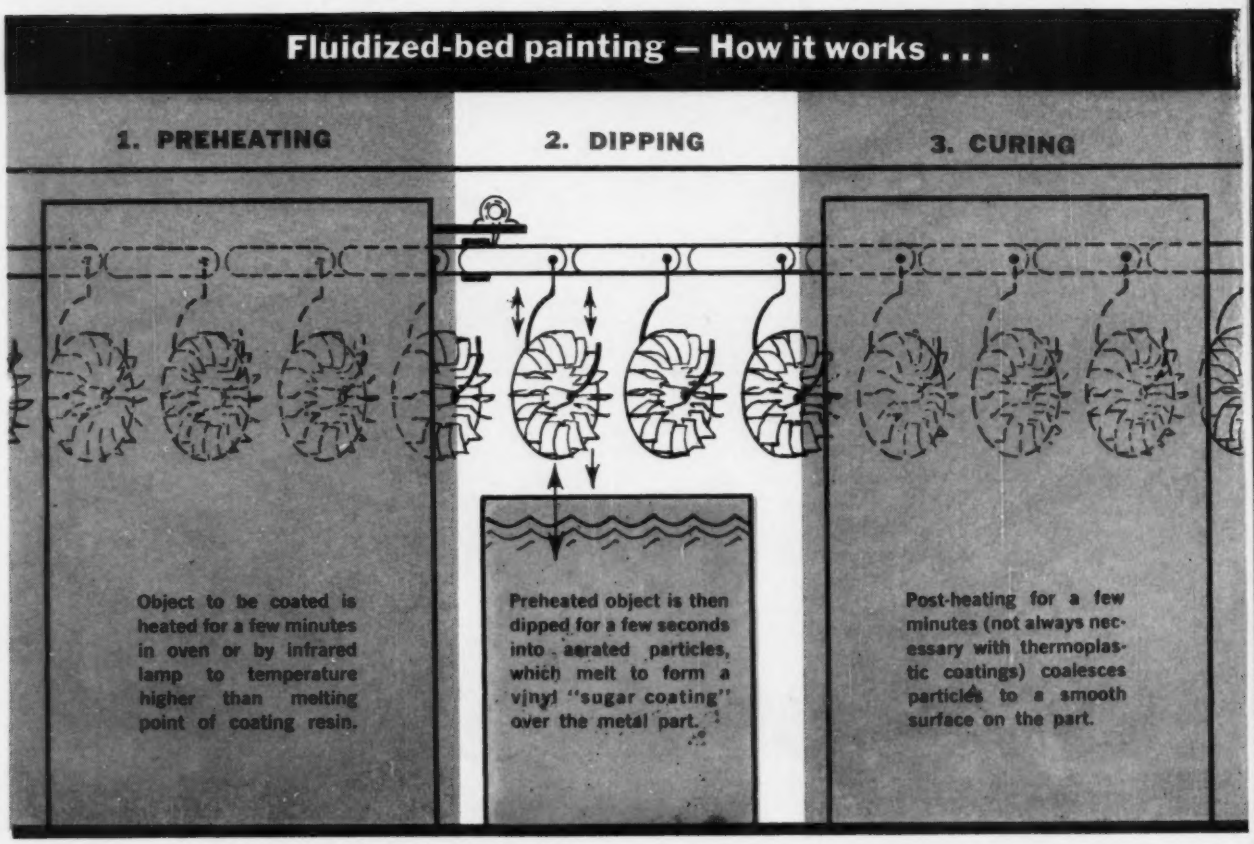
Fluidized-bed painting – How it works . . .
1. PREHEATING
2. DIPPING
3. CURING
Object to be coated is heated for a few minutes in oven or by infrared lamp to temperature higher than melting point of coating resin.
Preheated object is then dipped for a few seconds into aerated particles, which melt to form a vinyl "sugar coating" over the metal part.
Post-heating for a few minutes (not always necessary with thermoplastic coatings) coalesces particles to a smooth surface on the part.

'Powder Painting' Potential:

In the near future — probably in November — a major U.S. company will unveil the $1-million automatic painting operation it's now installing. When completed it will be the largest fluidized-bed coating operation ever constructed, will represent a high mark for a coating technique that appears ready to challenge liquid-type coatings for many markets.

This year well over $1 million worth of resins will be sold for use in solventless, fluidized-bed coating systems. That's three times the size of the U.S. market last year and a ninefold increase over the year before that. Looking ahead, fluidized-bed resins may well represent a $50-million/year market by '70.

What It Is: In fluidized-bed coating a preheated object is immersed for a few seconds in a powdered, fusible plastic, which is maintained in a "fluidized" state by an ascending current of gas, usually air. The plastic particles that come in contact with the hot object fuse and adhere to form a thick coating over the object. If not enough heat has been stored in the object to coalesce the adhered particles to a smooth, uniform coating, post-heating may be needed, especially for thermosetting powders. Color or type of plastic can be readily changed by simply attaching a new container of resin to the fluidizer's air outlet.

That's a fairly generalized description of the technique; there are a number of refinements that have been developed for special applications. For instance, it's not necessary to preheat the part for immersion in the fluidized bed. A tacky coating can be applied, or an electrostatic charge can be used to make particles adhere. Another refinement—induction heating—allows heating of the part in the fluidized bed. (This system is used to jacket wire.)

What's Used: Currently, the plastics most used are cellulosics, vinyls, epoxies, nylon, Teflon, polyethylene, and Penton (Hercules Powder's chlorinated polyether). Other materials that can be used: polystyrenes, acrylic resins, bitumen (such as gilsonite or asphalt), shellac and wax, as well as fillers such as slate, asbestos, metal powders, and graphite.

A number of things add to the advantages of coating with solids. Among them: the elimination of solvents, simple equipment requirements, adaptability of the system to high-speed automated control, little material loss, ability to apply heavy coatings in a single pass, easy handling of material, simplicity of changing colors or resins, and elimination of many precoating operations such as deburring or buffing. Moreover, many plastics that cannot be applied from solution can be applied by fluidized-bed techniques.

. . . and what it costs

WANTED:

A 10-mil vinyl coating on a metal part measuring 1 sq. ft. in area.

ASSUME:

That vinyl is bought in 5,000-lb. quantities and that three men are working on a 1,000-parts/hour coating line (burden rate: $8/hour) with a material loss factor (including losses, rejects, etc.) of 5%.

CYCLE:

Preclean (10 minutes), prime (3 minutes), preheat at 550 F (3 minutes), dip (10 seconds), post-heat at 500 F (1 minute).
TOTAL: 17 MINUTES, 10 SECONDS

COSTS:

Coating primer, 0.1¢/part; loss factor, 0.3¢/part; vinyl raw material, 6.1¢/part; labor: direct and burden, 2.4¢/part. TOTAL: 8.9¢/PART

$50 Million by '70

Offsetting these advantages, however, are limitations. High-temperature requirements rule out some types of materials; thin coatings (under 5 mils) are difficult to obtain; masking is sometimes complicated; and there's danger of explosion under certain conditions. Not disadvantages *per se,* but worth considering, are the relatively high costs of the resins involved (ranging from about 75¢/lb. for polyethylene to $5/lb. for Penton) and the royalties (5% of the cost of the resins) that must be paid to the U.S. licensor of the process, Polymer Corp.'s subsidiary, Polymer Processes Inc. (Reading, Pa.).

Polymers and Patents: Tracing Polymer Corp.'s entry into the fluidized-bed coating field produces a fairly good picture of the history of this process.

Although fluidization of solid particles has been done for some time in hydrocarbon cracking processes, and while there have long been methods of using powdered plastics for coatings, the German firm of Knapsack Griesheim AG. (Cologne), a Hoechst subsidiary, got a German patent on the process in '52. The company's interest in this area stemmed from work it had been doing in the mid-'40s—flame spraying such thermoplastics as polyethylene, polyvinyl chloride and polyamides.

High labor costs and considerable loss of material led the company to look for a new application method.

Erwin Gemmer of Knapsack is credited with devising the fluidized-bed technique; the system was given the name "whirlsintering" (Wirbelsintern), by which it is still called in Europe. Polyethylene and nylon (especially nylon 11) are the principal materials used overseas in the process.

Who's on First: It's not altogether clear just which company is responsible for introducing fluidized-bed coatings in the U.S. Generally, American Agile (Bedford, O.) is given credit for it. The company has long had a reciprocal agreement on developments with Knapsack, and it's said that American Agile first proposed the system here, assuming that it had exclusive U.S. rights to it.

General Electric, one of the first companies to do extensive research on the process in the U.S., did some of its early work in the field with American Agile. But GE apparently did not want what it felt might be restrictive agreements on its research.

Despite its relationship with American Agile, Knapsack eventually signed an agreement with Polymer Corp. (Reading, Pa.) giving that company's subsidiary, Polymer Processes (now the Whirlclad Division), an exclusive license, with rights to sublicense in the U.S. Later the German firm extended this license arrangement to cover Canada. Currently Polymer's right to license U.S. and Canadian firms is vested in U.S. Patent 2,844,489, issued July 22, '58. There are other patents pending, however.

Who's Using: A number of large U.S. companies have begun extensive use of the fluidized-bed technique. Westinghouse is using it now to coat transformer parts, as is Line Materials Inc., (Milwaukee, Wis.). Also making extensive use of the technique is Rockwell Manufacturing Co., which is coating valves with Penton.

Frigidaire has pull-out refrigerator shelves coated with fluidized-bed nylon in its '60 models. International Harvester uses nylon-coated thrust bearings on some of its earth-moving equipment and Chrysler's Valiant has several parts so coated. Other current applications of the technique: the painting of light bulbs, drum linings and lighting panels.

Other users of the technique include makers of plumbing fixtures, refinery equipment and bottles. Potentially, aerosol bottles could be jacketed in plastic by this process. Altogether some 100 U.S. companies are using fluidizing-bed on a production basis; 300 others are using it on a research basis.

Wait and See: Although U.S. man-

ufacturers are keeping close tab on the technique, most of the actual work is now being done by custom finishers. One of the largest of such installations in the country, the Harlo Division of Kirkhof Manufacturing Co. (Grand Rapids, Mich.) is using the system to cover throttle levers control lines for one of its tractor-manufacturing customers. Bauer Brothers (Springfield, O.) is using the technique for coating refrigerator parts for one of its clients, and Engineered Plastics Inc. (Gibsonville, N.C.) is coating parts for machinery used in the textile and furniture industries.

Polymer Corp., which also does custom coating, is currently using 10,000 lbs./month of resins for fluidized-bed coating at its Santa Ana, Calif., plant, is constructing a new plant in Rolling Meadows, Ill., for customized coating and is enlarging its coating operations at its main plant in Reading, Pa.

Resin Sources: The biggest manufacturer of fluidized-bed coating resins in the U.S. is Polymer Corp. Its Whirlclad Division sells the resins under the name Corvel Fusion Bond Finishes. Some of the other major suppliers of coatings are Minnesota Mining and Manufacturing, which makes an epoxy resin powder, which it sells for $1.85/lb. under the tradename Scotchcast Resin XR-5026, as well as an older product dubbed XR 5005. But 3M isn't selling these products for fluidized-bed use only; it claims they also work well in spray applications.

Michigan Chrome and Chemical (Detroit) is selling vinyl, nylon, epoxy and cellulosics for fluidized-bed processing under the name Miccron. The powders now constitute a greater share of the company's business than plastisol, which had been considered its standard product. Another supplier of specially formulated fluidized-bed resins is Armstrong Products Co. (Warsaw, Ind.). It sells both thermoplastics (such as polyethylene, butyrates and vinyl acetates) and thermosets (such as epoxies) under the tradename Vibro-Flo. In addition to selling powder, the company has made a lot of equipment, is currently seeking a patent on a vibratory apparatus, called a Micro-Fluidizer, which prevents channeling of particles in the fluidized-bed air stream. (Polymer Corp., too, has done work on this type of vibratory fluidizer.) Armstrong has made another contribution to the field; its Report L-131, prepared by Max M. Lee, is probably the best study on fluidized beds.

American Agile is supplying a finely divided branch polyethylene, Agilene, and a linear polyethylene, Agilene AT.

Solid Future: Increased interest is being expressed in fluidized-bed coating, now that considerable know-how has licked some of the problems that formerly plagued it. Joseph Gaynor of General Electric's General Engineering lab, who has done considerable research on fluidized-bed coatings, recently told an American Chemical Society group that the process's adaptability to high-speed coating may enable powders to supplant many liquid coatings.

There's this too: Westinghouse's Headquarters Manufacturing Laboratory has constructed a model of a '65 manufacturing plant that includes a high-speed, conveyorized fluidized-bed system.

Although painting with powders won't replace liquid application, the system will steal some markets from the older technique, cut down considerably the market for coating solvents. For the paint manufacturer looking toward tomorrow's markets, there's good reason to check to see if he might not get on more solid ground than he is now.

PRODUCTS

New Cream Jar: The Imco Container Corp., a subsidiary of Rexall Drug and Chemical Co. (Los Angeles) has developed a double-walled polypropylene jar for cream products. The jar can be molded to match the dimensions and capacity of standard flint and opal jars and is lighter than either. Decorating may be applied by a hot-stamp process.

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Shellac Stabilizer: Acme Shellac Products Co. (Newark, N.J.) is marketing Can-Gard AC-83, claimed to be the first effective stabilizer and inhibitor for liquid shellac. It is said to prevent can corrosion.

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Aerosol Deicer: Free O' Ice, an aerosol spray for removing ice from windshields without leaving a film, is being manufactured by Consolidated Research and Manufacturing Co. (New Haven, Conn.) for The Firestone Tire & Rubber Co. Firestone will distribute the product to independent automotive supply dealers, in addition to its own outlets. A 10-oz. can will retail for $1.19.

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Rust Preventive: Lehigh Chemical Co. (Chestertown, Md.) is marketing a water-base rust preventive, Anderol L-536, for indoor or shed storage. The product can be sprayed, dipped, or brushed on machine tools, jet engines, outboard motors, machine parts, etc. It's available in 16-oz. spray cans, 1-gal. cans, and 5- and 55-gal. drums.

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Phosphating Cleaner: Turco Products, Inc. (24600 South Main St., Wilmington, Calif.) has developed a phosphating compound for simultaneous cleaning and phosphating of iron, steel and zinc. Paintite may be applied by immersion, spray washer or steam cleaner.

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Continental Spray Deodorant: A purse-size aerosol deodorant, called 8 x 4 Spray, is now being marketed in Europe. It's manufactured by Doetsch, Gretner & Cie (Basel, Switzerland) and packaged in an aluminum container about the size of a lipstick case. The valve is made by a European subsidiary of The Risdon Manufacturing Co. (Naugatuck, Conn.).

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Red Smut Preventive: An additive for steel-blackening baths that prevents formation of red smut has been developed by Enthone, Inc. (New Haven, Conn.). Ebonol Additive S, a viscous liquid, ties up dissolved iron and copper so they cannot deposit on blackened steel as red iron hydroxide, also is said to produce a deeper black color, reduce blackening time.

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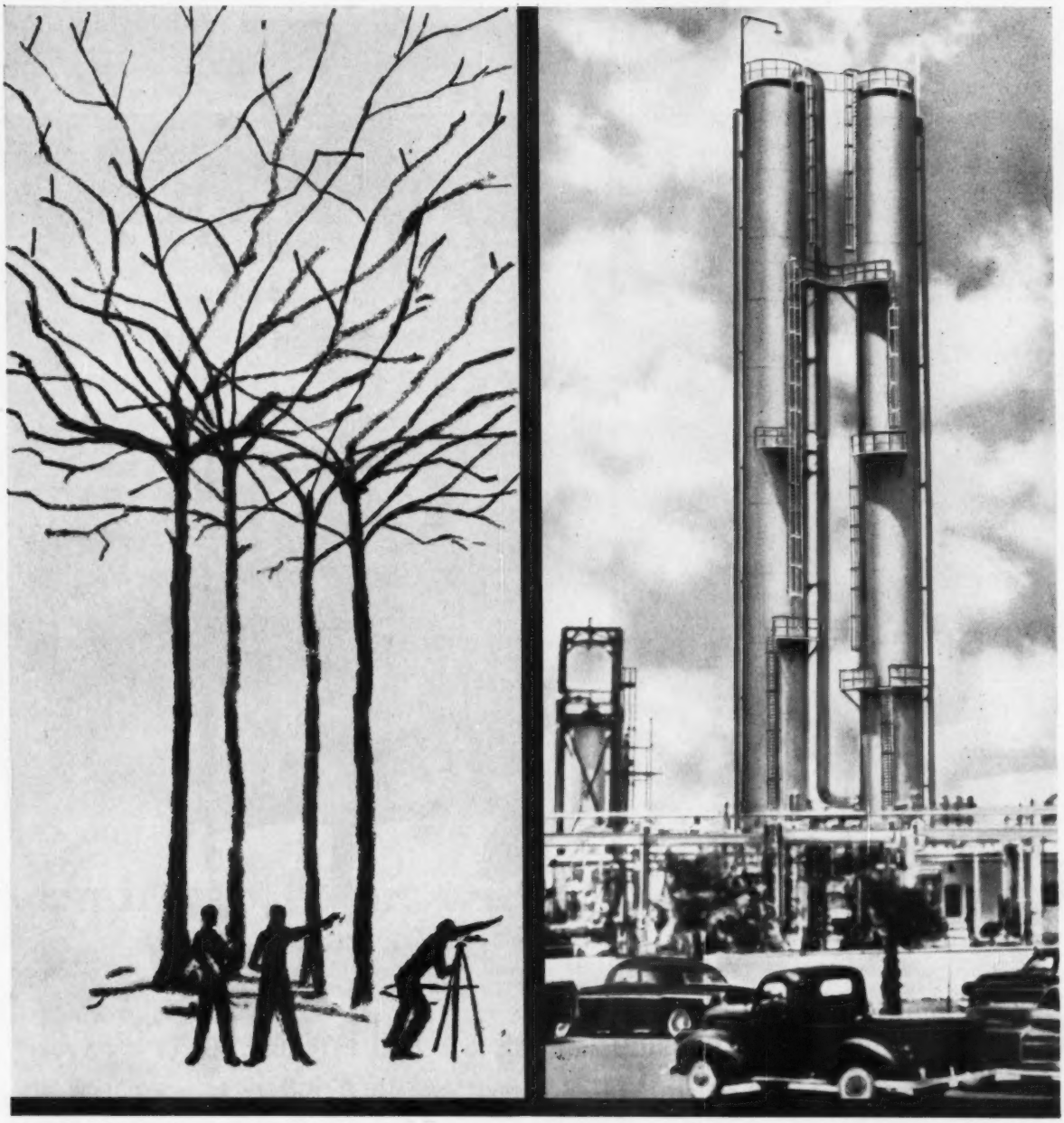
Fire-Resistant Coating: Desco International (Box 74, Buffalo) has developed a fire-resistant, 90% inorganic coating for interior and exterior building surfaces. It's said to be resistant to temperatures up to 1600 F, is available in a number of colors, finishes and textures. One coat of the product, called Tonecrete, is approximately as thick as a coat of regular exterior paint.



DELHI-TAYLOR'S Orthoxylene Plant on Stream...from inception to completion in **only 6 months**

Once again Delhi-Taylor has proved its reputation for performance . . . this time with the quick completion of its new orthoxylene plant to meet customer needs. The engineering survey was begun in January and material was processed on June 15! This is Delhi flexibility in action . . . its unique ability to expand into new petrochemicals with a minimum of delay.

■ The two 160 ft. high distillation towers, which feature unique plate design and arrangement, will be used primarily to produce high purity orthoxylene. The plant is designed so that other chemicals can be derived from the company's diversified petroleum and petrochemical feedstocks.

■ Delhi is now in production on high purity benzene, toluene, xylene, orthoxylene, higher boiling aromatics and a variety of aliphatic solvents. Our plant facilities are geared to move quickly in many new directions.

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The Morton Salt Company needed a new and better bag for its salt shipments—a moisture-resistant bag that would be easier to handle and ship, more flexible at low temperatures, highly resistant to abrasion and rupture, yet economical in cost.

To solve this problem, Chase developed the Poly-Ply Multiwall Bag featuring an entirely new construction. It combines—for the first time—the advantages of a ply of light-weight sheet polyethylene and heavy-duty multiwall paper. It provides excellent moisture protection...extra strength...new ease of handling...flexibility even at temperatures way below zero. After six months testing under commercial conditions Morton officials report highly satisfactory results!

If you package moisture-sensitive products—such as sugar, chemicals or fertilizers—this new bag can be a problem solver for you, too. It is now available in 25-, 50- and 100-pound sizes. Call your Chase representative for full information.

New and Unique Construction: separate, intermediate ply of sheet polyethylene, shielded by heavy-duty kraft paper inside and out, assures effective moisture protection, strength and easy handling advantages.

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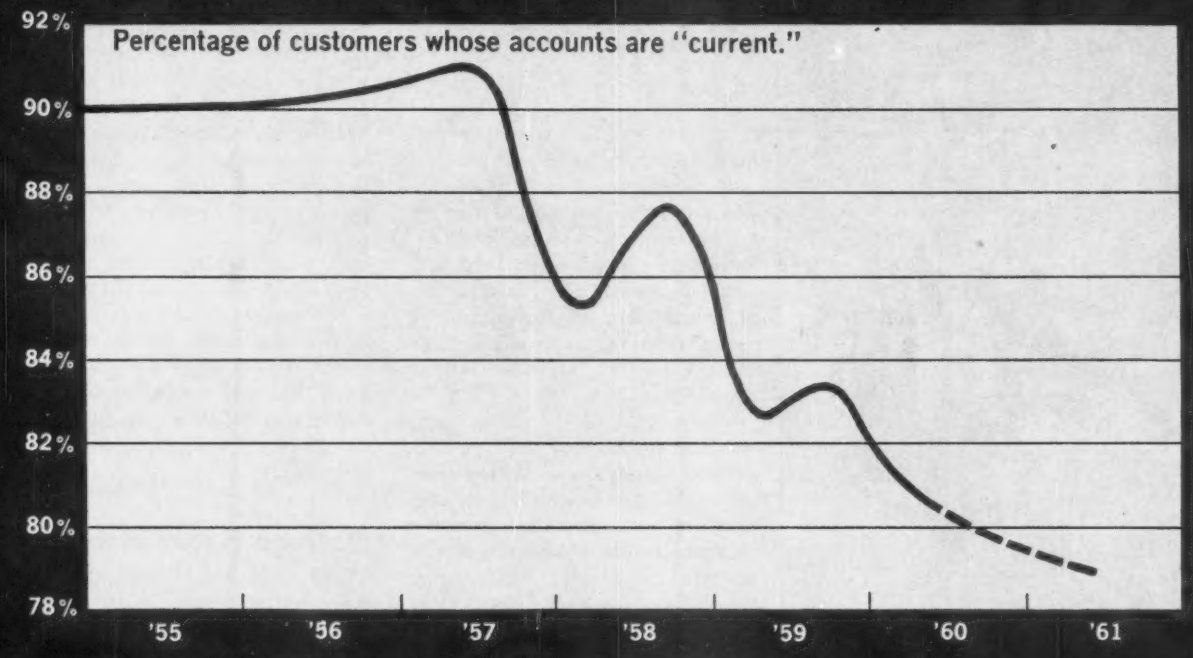

Coming to Terms with Payment Slowdown

Right now fewer CPI customers are paying their bills promptly than at any other time in the last five years. As a result, chemical sales managers are facing strong, new demands for credit extensions; while credit men, seeing little improvement ahead, are moving to spur prompter bill collections.

The most up-to-date figures from the Credit Research Foundation (New York) show that accounts receivable for the CPI—as well as for all industry—are definitely on the upswing. And the percentage of CPI customers who are paying their bills on a "current" basis—generally considered to be 30 days-net—has slipped to 80.5%, lowest proportion since the early '50s (*see chart, above*).

Credit men were worried a year ago (*CW, Oct. 10, '59, p. 99*) when this percentage of prompt-paying customers dipped to 82.7%; now it seems that this indicator of credit health may fall into the high 70s.

According to CRF, the number of days' sales outstanding has lengthened to 36 from last fall's 35, a further indication of lagging bill payments.

Bad debt losses are climbing, too. This reverses what was almost the only bright spot amid the disappointment of last fall's worsening of the credit situation.

According to Dun & Bradstreet's business failure index, business failures during the first six months of '60 rose to 7,707, up 5% over the previous half year. Significantly, dollar values of these business failures rose to $453.8 million, up some $84.6 million or 25% over the earlier six months.

Chemical credit men throughout the industry and at the National Chemical Credit Assn. agree that receivables are becoming harder to collect and thus more expensive. Some even told CHEMICAL WEEK: "Getting your money right now is harder than it's been for many years."

Across the Board: Generally, the credit pinch has hit at most segments of the CPI. Of course, traditionally weak areas such as agricultural chemicals, resins and plastics, contractors and export sales are showing even more signs of difficulty than most.

But the credit pinch has been hitting companies in many lines. Even the once-prompt-paying "blue chip" companies are pressing for more time to pay. And in today's hotly competitive buyer's market, they're getting it.

Main reason cited by most CPI sales and credit men is the overcapacity in many product lines, resulting in "sell at any price" pressures. Often these take the form of "sell under any credit terms"; and credit men make no bones about it: this kind of competition has seriously weakened credit term structures, they feel. What's more, they add, it has considerably driven up the cost of doing business.

Naturally, sales managers are working hard right now to boost sales

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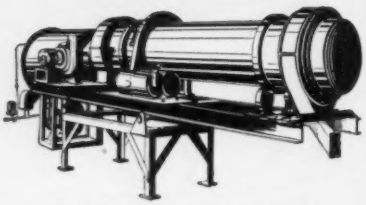
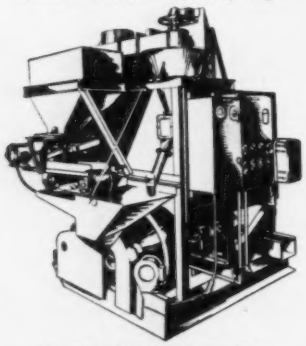
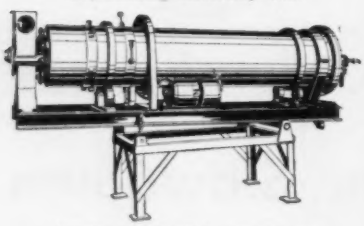


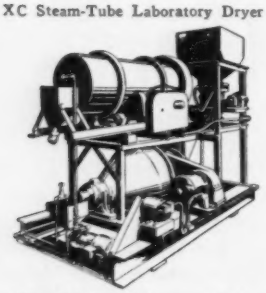
XB Indirect-Heat Laboratory Dryer



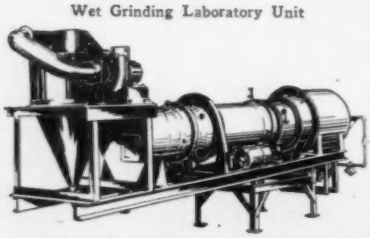
Dry-Grinding Laboratory Unit



XC Steam-Tube Laboratory Dryer



Wet Grinding Laboratory Unit



XH-XF Direct-Heat Laboratory Dryer

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volumes. Thus, many marginal accounts—which usually wouldn't get credit extensions from chemical suppliers—are getting plenty of time to pay. "After all, it's these marginal accounts that help us achieve the peak return stemming from near-capacity sales," notes one credit manager.

Tight money is cited by many as still important in keeping the pressure on credit terms, although there are strong signs that interest rates are now ready to drop somewhat. Many observers feel that the Federal Reserve Board's recent twofold cut in the rediscount rate has not yet been felt.

But just last week many banks across the country chopped the prime borrowing rate—the rate charged—to 4½% from the previous 31-year high of 5%.

Among some of the credit men, this move sparks hope that commercial lending rates may slacken generally, making it easier for their customers to get commercial financing for their current obligations. Credit managers are keeping their fingers crossed that these lower interest rates will slow down or even halt the tendency to "lean on" chemical suppliers for financing.

Company Views: Despite the higher costs of extending credit, most sales and credit managers feel they've got to put up with some customer demands for more time just to remain competitive. No one has an easy solution to this problem; but there are some things CPI companies can do to live with the problem more comfortably, they note.

For one thing, credit men are becoming somewhat more cautious about taking risks unless they're quite convinced they are reasonably sound ones. Credit men are now more inclined to refuse marginal business—for credit reasons—than they have been for years. Their reasons: naturally, with receivables mounting, it now costs more than ever to wait for the money. But credit and sales management is finding, too, that many prompt-paying customers object rather strongly to a supplier's granting easy credit extensions to their competitors while they continue to pay bills on time.

Another way to live with the credit pinch, say CPI credit men, is to go all-out to clean up delinquent accounts, collect overdue bills. Of course, this—as well as exercising greater selectivity—has been tried before, not usually with spectacular success. It's for this reason that most industry observers are pinning hopes on expansion of consumer demand to improve credit practices.

Outlook: Unfortunately, most economic pulse-takers are anything but wildly optimistic at present. Granted, financial managers look for the cuts in the Federal Reserve Board's rediscount rates to be reflected more widely in lower interest rates. And with government spending trimmed to allow a surplus—at least for now—many observers are hopeful that the economy may regain some of its lost zip.

But the consensus of CPI observers is that the credit pinch will get worse, but not much worse, before it levels off. The coming months will continue to challenge sales and credit men to keep goods moving on reasonable terms.

College Sales Meeting

Last week Pfizer Laboratories Division of Chas Pfizer & Co. took a new approach to gearing its field sales force for maximum effectiveness—it sent them back to college.

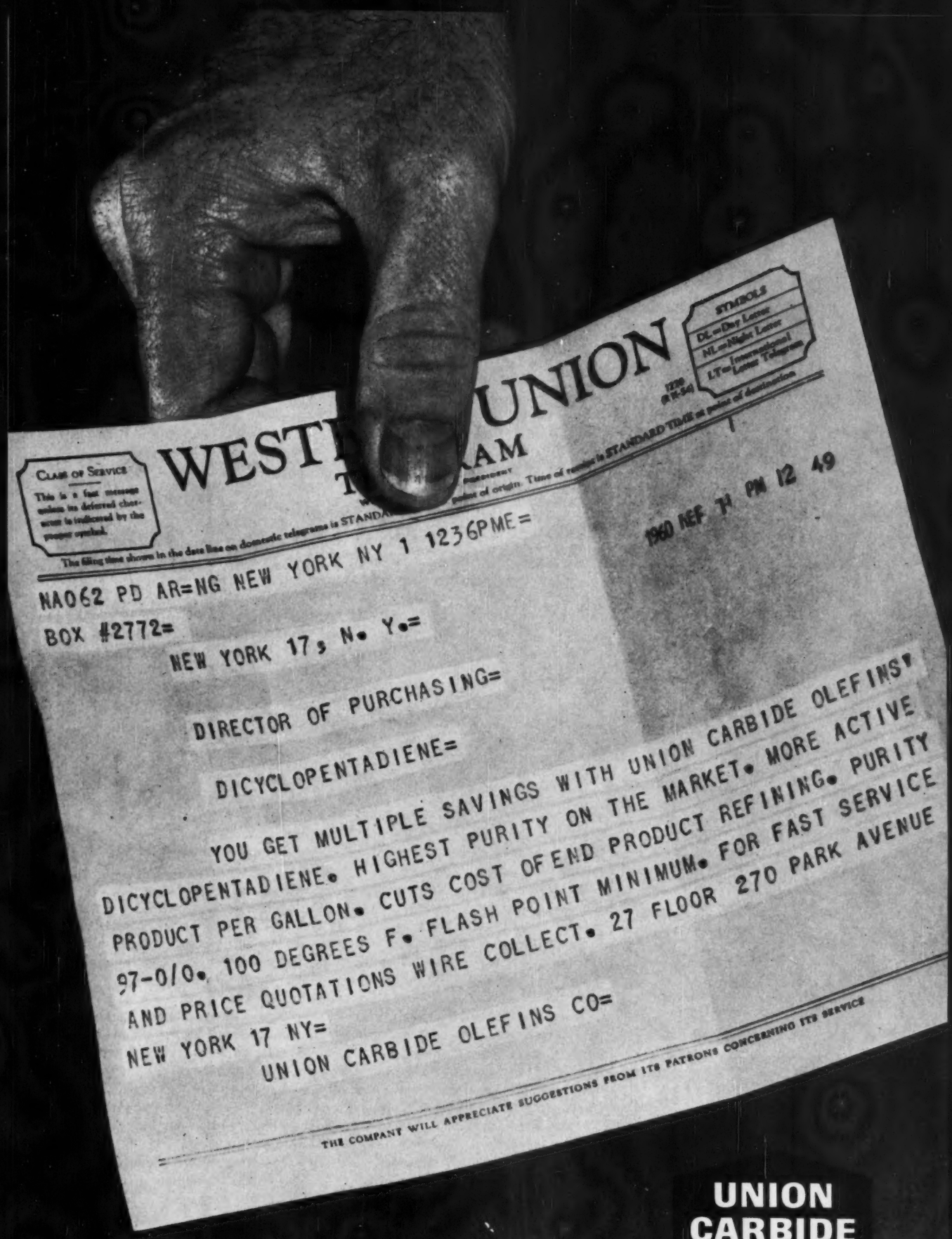
The Brooklyn-based pharmaceutical producer sent the division's entire field sales force—over 850 in all, including field sales managers—to Syracuse University (Syracuse, N.Y.) for a week's intensive classes and meetings.

During the week the Pfizer sales staffers took courses in biological sciences, the characteristics and uses of newer company products and basic sales and presentation skills.

However, the week-long national sales meeting actually was not held in conjunction with the university. In fact, all classes were taught by Pfizer scientists and marketing men, not by university instructors. The reason for choosing a university campus: extensive dormitory and classroom space for the huge meeting.

Although CPI companies with large sales staffs differ widely on the merits of holding large national sales meetings, Pfizer's national sales seminar shows how one company—considered by many to be among the most aggressive drug marketers— figures it can most efficiently provide refresher training and technical updating.

During the week the group was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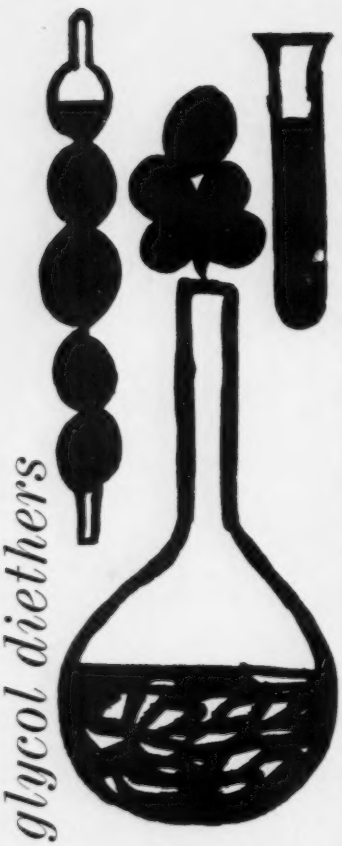

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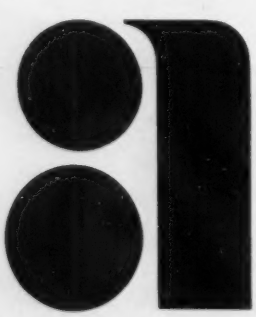


ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN ● INDUSTRIAL CHEMICALS ✱ REFRIGERATION PRODUCTS ● FIRE FIGHTING EQUIPMENT

divided into 10 sections of 85-90 men each. These smaller groups took the various courses, which included these subjects: seven hours of anatomy, physiology, bacteriology and antibiotics; eight hours of sales psychology, sales presentation, hospital selling, public speaking and territory management; 14 hours of recreational activities, several hours' discussion of the chemistry and pharmacology of new Pfizer drugs (Niamid, Daricon, Vistaril, Diabinese) and several hours of regional and district sales meetings.

To ensure an attentive audience, the company gave a comprehensive examination on the last day. Doubtless, meetings of this scale run up quite a tab. But Pfizer figures this is the most effective way to keep its sales staffers well informed and enthusiastic.

Charting Inventories

CPI marketing men, accustomed to measuring inventory conditions primarily on the basis of inventory-to-sales ratios, may pick up some tips from a report just issued by the National Industrial Conference Board.

The booklet, "Measures of Inventory Conditions" — Technical Paper No. 8, proposes a novel equation for measuring inventory levels that uses three ratios: inventory-to-sales, unfilled-orders-to-sales and new-orders-to-sales.

Based on the equation presented in the report, NICB states that only slight additional inventory accumulation should take place in the coming months.

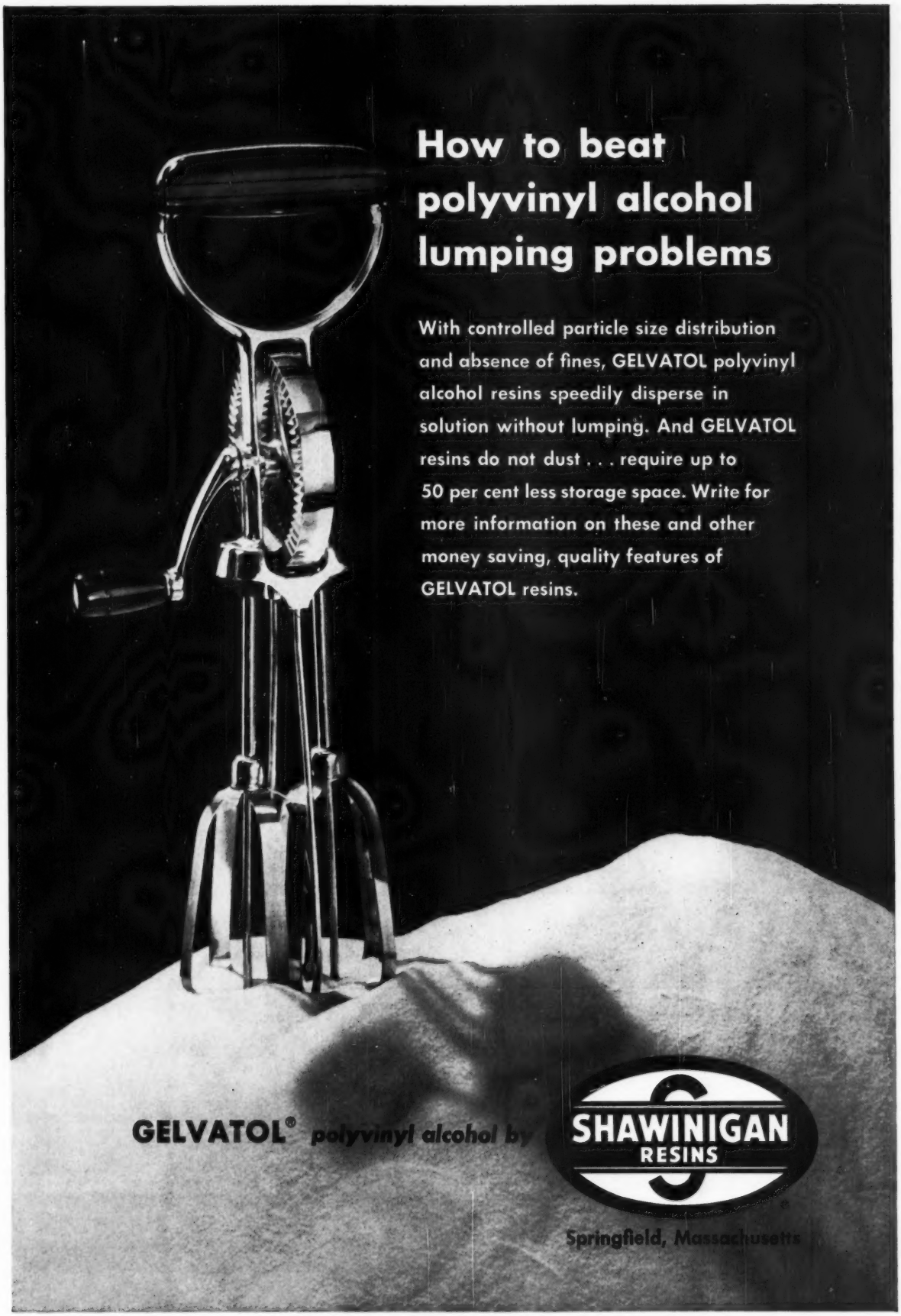
Besides being useful for anticipating over-all business inventory shifts before they occur, NICB reports, the equation derived in the report can be applied to inventories at the industry level, possibly even specific types of inventories.

The report authors checked their new equation against historical patterns of inventory movement, found that it is "more informative" than using simply the inventory-sales ratio. In fact, the board notes that present inventories appear to be sharply below normal if viewed against historical relationships of inventories to sales. Using the new equation, however, the present levels seem to be about normal, the board adds.

Single copies of the report: $3, associates; $15, all others.

DATA DIGEST

- **Proprietary Drug Names:** New, 48-page pamphlet gives the proprietary names of new drugs just added to the '60 revision of the U.S. Pharmacopoeia. "Proprietary Names of Official Drugs" is available at 25¢/-copy from the American Pharmaceutical Assn. (2215 Constitution Ave., N.W., Washington 7, D.C.).
- **Multiwall Bags:** New, 16-page booklet describes multiwall paper shipping sack types and closures, illustrates proper storage of empty multiwalls, correct handling of filled bags, and describes various packaging services. Bemis Bros. Bag Co. (408 Pine St., St. Louis 2, Mo.).
- **Lube Oil Additive:** Article explains uses of cyclohexanone as a lubricating oil detergent additive. Benefits reported: reduced engine smoke and oil leakage, prevention of sludge formation and reduced oil seal replacements. Dept. P.R. 53, Allied Chemical Corp. (40 Rector St., New York 6, N.Y.).
- **Handling Ammonium Nitrate:** Folder describes recommended storage and handling measures for fertilizer-grade ammonium nitrate. Single copies are free, bulk quantities are 5¢ each. National Plant Food Institute (1700 K St. N.W., Washington 6, D.C.).
- **White Oils:** Folder gives specifications and uses of white oils, petrolatums and ointment bases. Pennsylvania Refining Co. (Butler, Pa.).
- **Ceramics:** Folder describes technical ceramic products, lists typical properties of several types, including aluminas, porcelain, magnesia and foamed alumina. Also included: some tips on proper design of ceramic parts. Gladding, Mc Bean & Co. (1551 South Primrose Ave., Monrovia, Calif.).
- **New Intermediate:** Technical bulletin presents property and reaction data on pentaerythritol tetrakis beta-cyanoethylether, an intermediate based on pentaerythritol and acrylonitrile. Delaware Chemicals, Inc. (P.O. Box 148, Wilmington), Del.).
- **Handling Export Sales:** New, 12-page brochure outlines activities of firm set up to manage export sales for U.S. companies. Platka Export Co. Inc. (2833 South Calhoun St., Fort Wayne, Ind.).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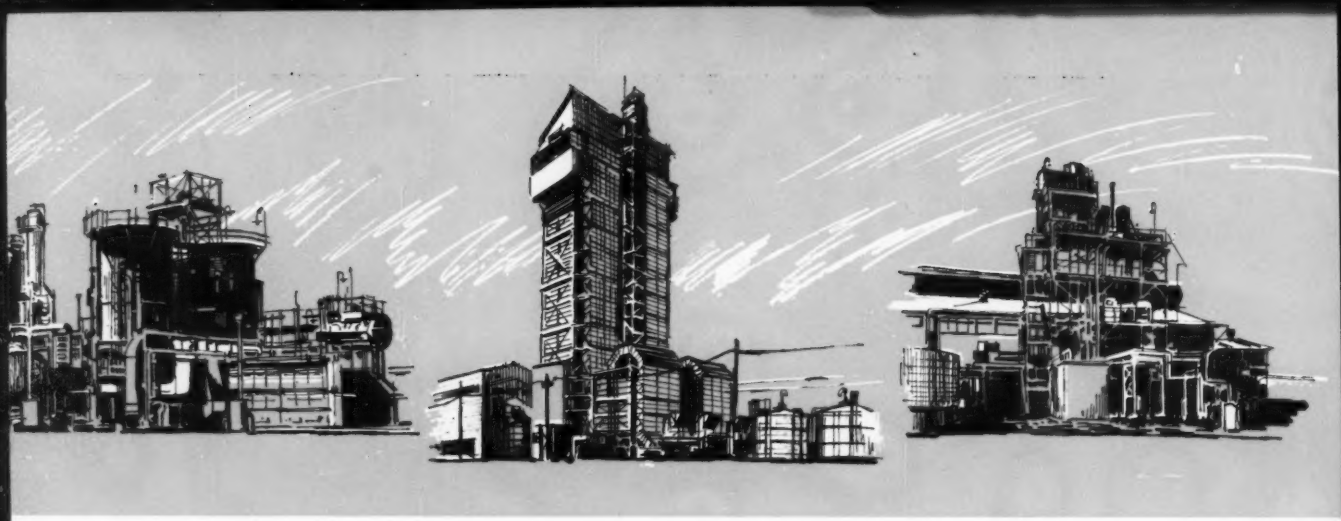

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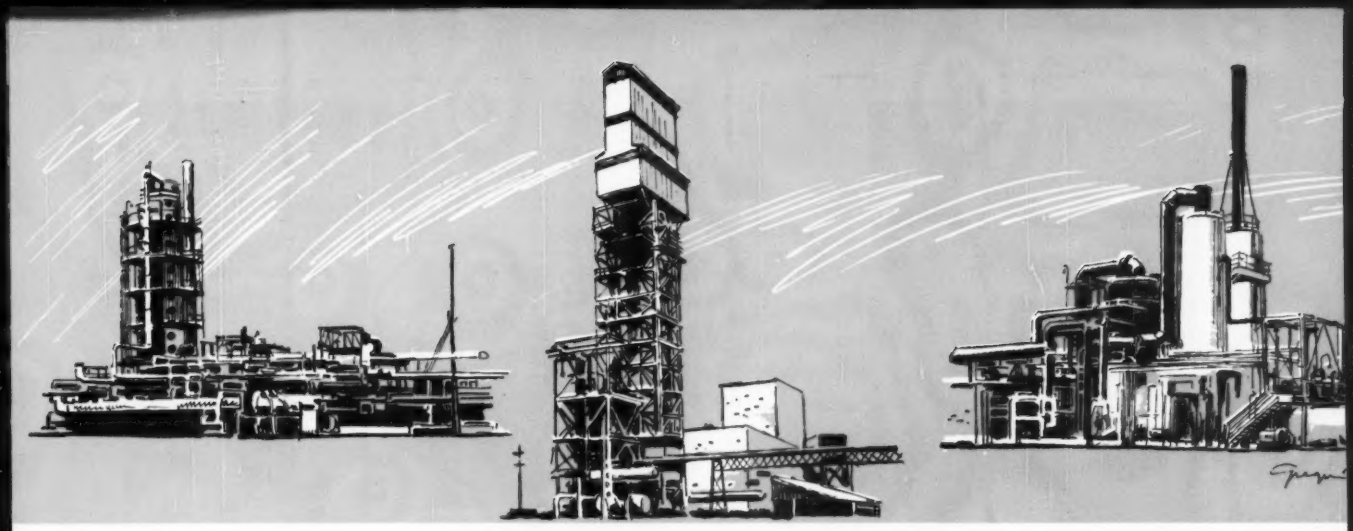

In India, Pakistan and Japan; in England, France and Italy; in Hawaii, Sumatra and Formosa; in Australia, South Africa and South America; in more than half the states of the Union and in every highly populated area on earth, Chemico-designed plants are producing basic fertilizer chemicals to increase world food production.

Chemico's experience in designing plants to produce fertilizer chemicals is unmatched by any other engineering company in the world. More than 200 Chemico sulfuric acid plants are now in operation. Sixty-five Chemico ammonia plants are on stream or under construction. In January of this year, Chemico completed its thirty-fourth nitric acid plant. Other Chemico plants now in production or under construction have capacities for producing 3,700,000 tons per year of ammonium sulfate and 1,600,000 tons per year of ammonium nitrate. When the capacity of the Chemico urea plants now under construction in Pakistan and the U. S. is added to what is being produced at plants in Japan, Canada and elsewhere in the U. S., the Chemico urea process will account for more than 400,000 tons per year.

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Technology
Newsletter

CHEMICAL WEEK
September 3, 1960

Construction of the first plant to recover gypsum produced as a by-product in the manufacture of wet-process phosphoric acid (*CW, Aug. 27, p. 69*) is now under way. The process, developed by Barrett Division of Allied Chemical, is based on successful separation and neutralization of corrosive acids contained in the gypsum after it leaves the filters in the wet-process plant. If the process proves economical, it will offer new competition to natural raw gypsum ore imported from Nova Scotia.

•

A small, closed-cycle refrigerator that operates at —452 F, just eight degress above absolute zero, may speed development work on a variety of industrial and military applications that perform best at ultra-low temperatures. The refrigerator, developed by Arthur D. Little, Inc. (Cambridge, Mass.), is about 9 in. in diameter, 28 in. long and weighs less than 100 lbs. It reportedly can maintain constant temperature at plus or minus 0.06 C. First commercial application of the new system was made a year ago: as an 8-oz. unit for chilling airborne infrared target detectors to —320 F (*CW, Sept. 19, '59, p. 84*).

•

Cheaper solar stills for saline-water conversion may result from plastic-coating research at Philadelphia's Franklin Institute. Glass is currently used in solar still "roofs" because plastics lack the wetability of glass, don't allow condensing vapor to flow smoothly to "gutters." Instead, droplets fall back into the salt water, have to be redistilled.

The institute's research chemist Robert Erb has succeeded in making plastics such as Du Pont's Teslar (polyvinyl fluoride) more wetable by coating them with titanium dioxide. His technique, Erb tells CHEMICAL WEEK, is hydrolysis of titanium ortho esters, a practice now used to promote adhesion between Teslar and other plastics. While solar still roofs made by this method now cost about the same as glass (about 15¢/sq. ft.), Erb expects the comparative ease of fabricating plastics and the long-term price reduction outlook for Teslar to favor the plastic's use.

•

Two new high-boiling coating solvents with potentially broad applications have been put into commerical production by Shell Chemical. The compounds are a keto-ether, called Pent-Oxone solvent (chemically it's 4-methoxy-4-methyl pentanone-2) and a glycol-ether called Pent-Oxol (chemically, 4-methoxy-4-methyl pentanol-2). These products are noteworthy because they can dissolve such dissimilar resins as acrylic, vinyl, epoxy, urethane and nitrocellulose. The automotive and furniture fields are looked to as the major users of the solvents. Shell Chemical is turning them out at its Martinez, Calif., plant. Price of Pent-Oxone: 17½¢/lb. in tank-car lots; Pent-Oxol, 19¢/lb.

•

An important use for waste liquors from sulfite paper wood pulping mills is being pushed toward commerical development by researchers at Michigan College of Mining and Technology (Houghton).

Laboratory studies show that the waste liquor can be used for a binder for dressing iron ore going to blast furnaces, bypassing the conventional high-temperature hardening step. If the venture proves successful it will open a major outlet for the liquor.

•

The Justice Dept. settled a three-year-old suit against B. F. Goodrich Co. involving manufacturing rights of Goodrich's synthetic-natural rubber—Ameripol-SN.

A consent decree issued by the U.S. district court of the District of Columbia requires Goodrich to license all companies that wish to make the polyisoprene compound. In return Goodrich will get a maximum royalty of 2½% of net sales of the product.

J. W. Keener, Goodrich president, said licenses to produce the rubber are now available to manufacturers in the U.S. and Canada through Goodrich-Gulf Chemicals, Inc. A Goodrich spokesman said "quite a few large companies, both here and abroad," have expressed interest in making the product.

The process, which uses a Ziegler catalyst system, was developed by Goodrich in '54. It marked the first time that the molecular structure of synthetic rubber duplicated that of natural rubber, Goodrich claims. Firestone, Goodyear and Shell (with U.S. Rubber) also have developed manufacturing techniques for this type of rubber, using different catalyst systems.

•

Two new agricultural chemicals debuted at this week's annual meeting of the American Phytopathological Society in Green Lake, Wis. Both are chlorinated organic sulfur compounds (experimental numbers 3944 and 4223) developed by Hercules Powder Co. They show particular promise as protective seed treatments for cotton, peanuts, and corn and other vegetables, and as a soil treatment for cotton. Both reportedly showed an edge over commercial standards in tests, neither is hazardous to handle.

•

Drug newsmakers this week: A substance that clots the blood of hemophiliacs (in test tubes) points the way to eventual control of the disease. Called autoprothrombin II-A, it's extracted from the blood of cattle, can't be used on human beings. But William Seegers (of Detroit's Wayne State University College of Medicine), who headed the research, anticipates isolation of a suitable agent.

New gains for cholesterol-lowering MER/29 (*CW, June 11, p. 45*) are being reported this week by researchers at Massachusetts Memorial Hospitals in Boston. In the Sept. 3 *Journal of the American Medical Association,* the drug made by the Wm. S. Merrell Co., division of Vick Chemical, is described as not only lowering serum cholesterol in heart patients but also possibly reversing cholesterol deposition in arteries. Conclusion: it's an "important new drug," causes no serious side effects.

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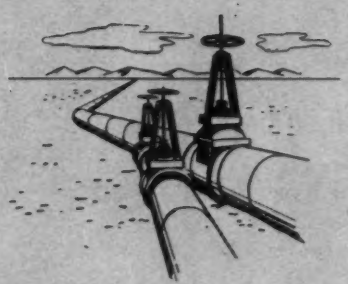

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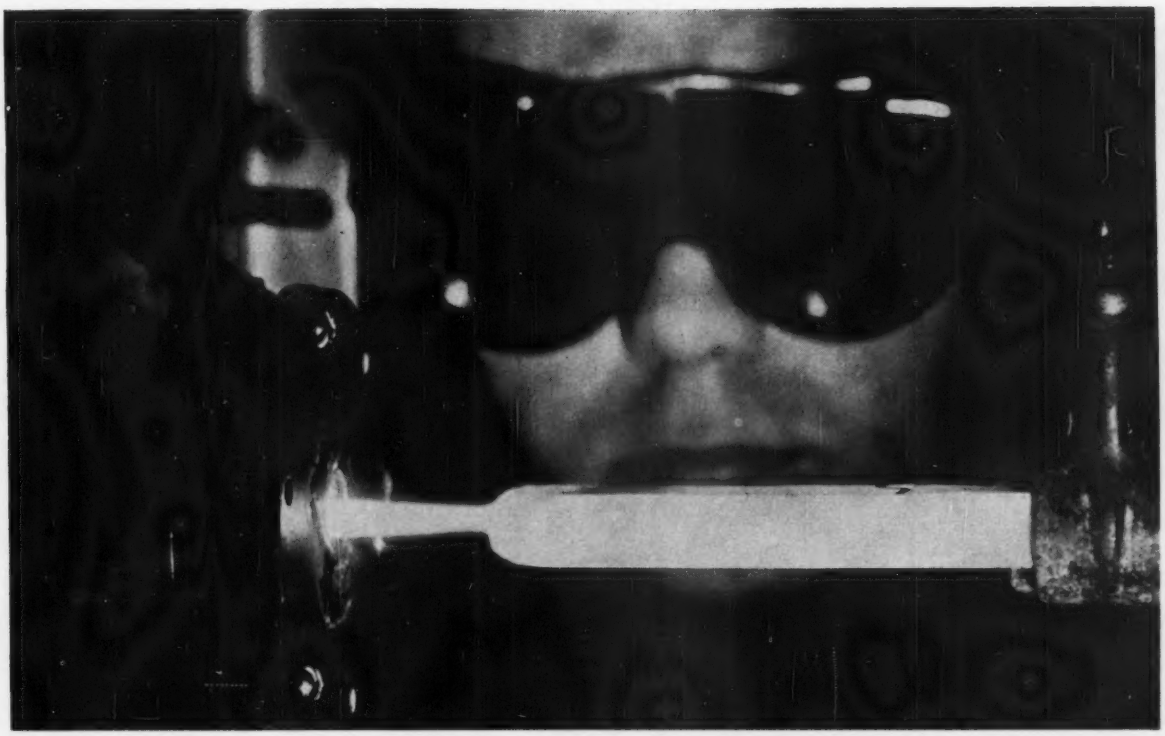


Plasma jet simulates missile re-entry temperatures in research on fused silica at Corning Glass.

Basic Research Probes New Glass Markets

At a yearly cost of about $65 million, research in the $2-billion glass industry is spawning new products at a record rate. In approach, this research is typified by glassmakers' new attention to systematic formulation and composition studies; in aim, it's marked by determination to find totally new markets for glass.

This week, for example, A. O. Smith Corp. (Milwaukee) is embarking on a project to set up the company's more than 3,000 glass formulations and attendant technical data for computer handling. When the two-year job is completed, Smith expects to tap the computer's memory in solving glass applications problems, possibly use it to "suggest" new uses.

An electronic computer is already proving highly useful at Owens-Illinois Glass Co.'s (Toledo, O.) Technical Center. In 208 hours of operation during '59 the computer did more than 12,000 man-days of problem-solving for the center's research staff.

Chemical Wonderland: The procedures of Smith and O-I are a far cry from those of many glassmakers, whose research is typically to make glass formulations empirically—and secretly—and to evaluate them in their own laboratories. Most of this empirical work involves sand, soda ash, lime, the old stand-bys of conventional glass, plus a variety of additives—borates and lead are typical of materials whose use is familiar.

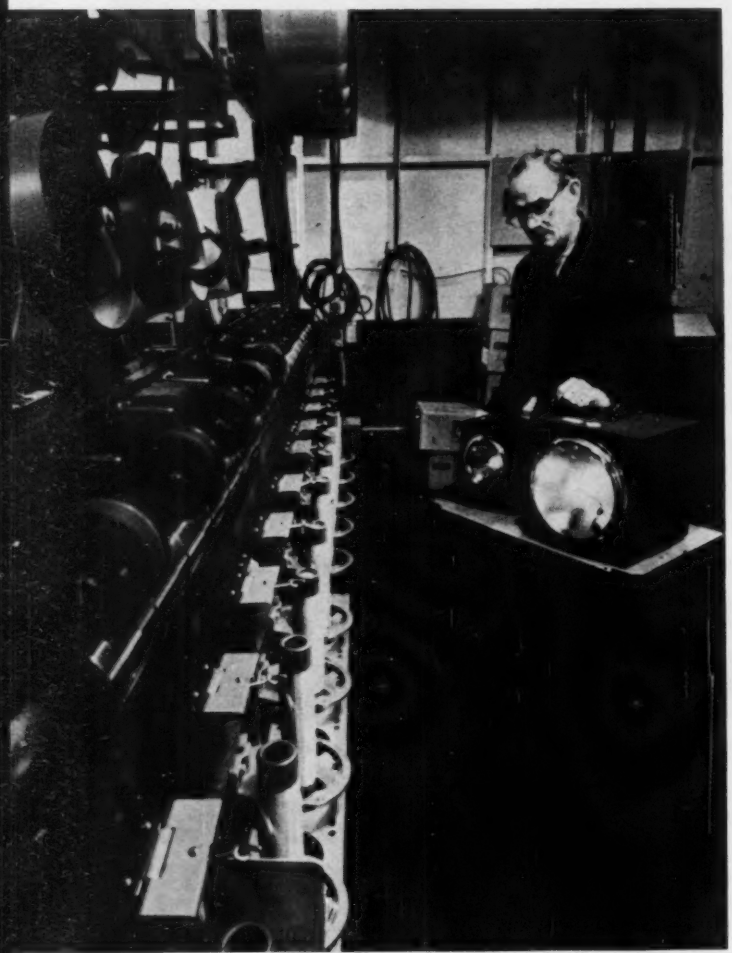
Bell Telephone Laboratories (Murray Hill, N.J.) is researching glasses that are a complete departure from the classic formula. Made of sulfur or selenium and metals such as arsenic or thallium, they melt at low temperatures, may have value in certain electronics applications.

Addition of nucleating agents (seed crystals), which impart ceramic properties to glass when the blend is heated, is a relatively new technique. Corning Glass Works (Corning, N.Y.), which pioneered in Pyroceram (*CW, June 8, '57, p. 64*), has now prepared more than 3,000 experimental Pyroceram melts.

Accent on Basics: Elaborate instrumentation is another earmark of the modern glass research lab. Plasma jets producing temperatures of 20,000 F and higher (by passing gas at high velocity through an electric arc); devices for studying the evolution of gases from glass; mass spectrometers; hot stage (2000 F) microscopes; rheology, photoelasticity, and other sophisticated devices are now commonly used in glass research. Testing equipment (*see pictures*) is also reaching a new stage of refinement.

Few companies can match the extremely fundamental studies of glass in progress at the National Bureau of Standards. NBS's goal: to probe the nature of glass structure (still not clearly understood), explore such properties as "excess entropy" (defined as "a measure of the greater molecular disorder of glass, compared with corresponding crystals of the same composition"). However, like its

Glassmakers forge profitable new products in modern



Downtwister handles glass yarn at Owens-Corning Fiberglas lab.

Technician measures strength of single glass fiber.

Telescope mirror is checked after finishing step.

industrial counterparts, NBS is working toward new glass products. It is developing special glasses for military uses and new methods of producing optical glass (e.g., using barium, titanium, silicon oxide systems).

Product Bonanza: Industrial research, on the other hand, is quickly lengthening the list of commercial glass items. Corning Glass, now spending more than $7 million (of sales of over $200 million) on research, lists these newcomers among dozens it launched in the past year:

• "Multiform" fused silica products. They're made by slip-casting or dry-pressing a special silica powder. The latter is made from a slab of condensed gaseous silica, features high purity. Multiform fused silica is extremely viscous at high temperatures and tends to sublime before it liquefies and flows. Feature: the surface is removed uniformly by ablation in plasma jet tests, suggesting possible missile uses.

• Moisture "getters" for semiconductors. The getter, made of porous 96% silica glass (impurities are kept as low as possible), is physically strong. Besides being able to absorb moisture, it can be handled safely and is easily mounted in transistor and diode enclosures.

• A new glass cement for sealing cathode ray bulbs. Like Pyroceram, it employs a nucleating agent, partly crystallizes when applied and heated.

• A range of new sintered glasses, called Clearform, for sealing glass to metal. Feature: they are transparent, permit visual inspection of the seal's stress patterns. Corning has applied for a patent on the process.

• Glass with improved infrared transmission for use in IR-guided missiles (for low-temperature targets) and in optical instruments. Another center of infrared glass research is Eastman Kodak (Rochester), whose aim, like Corning's, is to improve sensitivity to low temperatures. Kodak is also developing its line of rare-element optical glasses (e.g., lanthanum is one key ingredient) that contain no silica, produce less astigmatism than does conventional glass. Main use: in wide-angle camera lenses.

A leading specialty-glass manufac-

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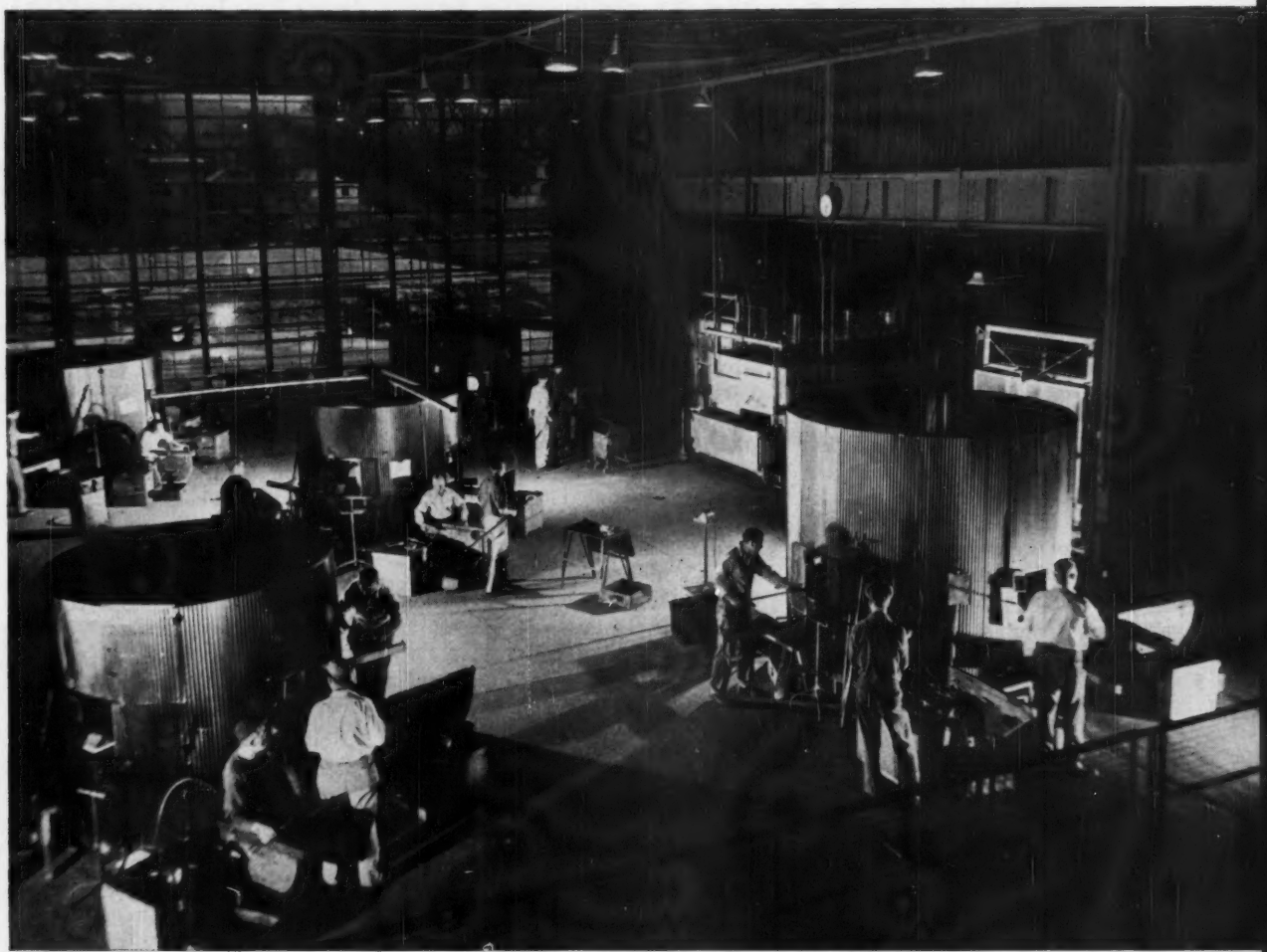

Corning Glass Works' hand shops and mass-production facilities turn out about 35,000 different products yearly.

turer, Corning does no fiber or plate glass research. That's more the province of other companies. Pittsburgh Plate Glass Co. (Pittsburgh, Pa.) is installing its newly developed chemical polishing process at its Cumberland, Md., plant. Intended for use on some mirrors and on glass for store fronts, the process has never been described even in barest outline. Libbey-Owens-Ford Glass Co. (Toledo), maker of a wide variety of flat glass for automotive, aeronautical and building use, refuses to talk much about its research, although it recently expanded its research facilities (*CW, Aug. 1, '59, p. 49*).

Owens-Illinois has a long-term research program based on glass as a structural material—a relatively lightweight substitute for steel. Another target: extremely flexible glass that retains resistance to wear, heat and chemicals. Recent products include colorless glass (instead of brown) that screens out ultraviolet light, and borosilicate glass pipe 6 in. in diameter (or less) for food and chemical plants.

With new coatings (probably silicones) the firm has increased the strength of glass as much as 20%. Theory: glass fractures start at very slight surface imperfections.

One idea on how glass can be strengthened by combined chemical and thermal treatment is offered by recent work of Russian scientists at the D. I. Mendeleev Institute of Chemical Technology in Moscow. It

CW PHOTO—SID HARRIS

A. O. Smith's James Sullivan developed glass coating for cheap steel.

is their object, too, to substitute glass for metals as structural materials.

Using industrial sheet glass, the researchers softened it by heating to 200 C then quenched it in a heated silicone liquid bath. Hardening was achieved by constantly decreasing the bath temperature in 20 C increments. The glass was then removed from the bath and dried at 200 C (higher temperatures reduce the strength).

Besides hardening and strengthening the glass in quenching (bending strength of 3-mm.-thick glass was increased up to 11-fold—to 55 kg./-sq. mm.), the silicone forms a polymeric film on the surface of the glass, seals surface flaws that might lead to fractures.

Glass Use Improvements: A less glamorous result of O-I research, but saving thousands of dollars in handling and shipping costs, is the redistribution of weight in the glass containers it manufactures. The modern containers are lighter in weight (as much as 50%) than earlier models, sacrifice no strength. Called "right-weighting," this redistribution of glass required new machines to produce the containers. For example, the company's one-way no-deposit beer bottle is 2 oz. lighter than the original version.

A. O. Smith is shooting for a variety of new glass products, besides the new process for bonding glass to inexpensive steel that it unveiled a few weeks ago (*CW Technology Newsletter, Aug. 27*). This process, invented and developed by Smith's James Sullivan, uses a coating of nickelous oxide, silica, and barium metaphosphate on the steel to promote glass adhesion. Smith is using the coating process in making water heaters, its Harvestore glass-coated steel silo for farmers, grain processors, etc., and in some of its Glascote chemical reactors.

Among other firms prominent in glass-coating research is Pfaudler Co. (Rochester, N.Y.). Its aim: to come up with more-durable (more resistant to thermal shock, in particular) glass linings that won't boost equipment costs.

Crystalline glass research is also getting study at Smith. Starting with glass containing seeds of partial crystals, Smith has succeeded in making a few examples of crystalline glass-coated steel. But nothing commercial is in sight. Problem: crystalline glass expands more slowly than conventional glass, must be carefully formulated to match the expansion rate of the steel.

Porous glass articles with ion-exchange properties are objects of study by Minnesota Mining & Manufacturing (St. Paul). A new British patent (839769) describes such "glassy structures" using titanium dioxide, zirconium dioxide and hafnium dioxide, among other inorganic constituents.

Fiber Fortune: Glass fiber, now included in more than 30,000 commercial end-products, is one of the most active areas for research. More than 750 million lbs. of the fiber (150 million lbs. of which are textile grade) are manufactured annually—and demand is rising fast.

Owens-Corning Fiberglas Corp. (Toledo), with research headquarters at Granville, O., has more than 250 staffers working on these typical problems:

- Chemicals that will provide a better bond for the fibers, make them more resistant to weathering and abrasion, make them more resilient.
- Evaluating heat flow through glass-fiber insulation at various temperatures and pressures.
- New raw materials and glass compositions to cut costs.

Recent products include polarizing light panels (light diffuses through Fiberglas flakes); Fiberglas air-conditioning filters coated with hexachlorophene for protection against bacteria; Fiberglas-asphalt shingles that are more durable than paper felt-asphalt shingles; and improved acoustical board.

Johns-Manville Fiber Glass Division (Toledo) is researching silica glass fibers that withstand 3000 F for rocket and missile applications. J-M's new glass-fiber chopped strand mat, called Granmat, reportedly "wets out" three to five times faster than do competitive products used in making reinforced plastics (e.g., in boats and translucent structural panels).

Lots of Vision: Glass, undaunted by plastics competition is shooting for totally new markets in addition to the ones it has today.

James Archer, PPG's director of glass research, predicts common use by '70 of variable transmission glass (changes color with amount of incident light) and "malleable glasses of steel-like strength." One of these predictions may be realized sooner. Japan's Prof. Taro Hayashi of Ochanomizu Women's College and Prof. Shoji Shida of Tokyo University of Technology have reportedly developed glass for curtains and blinds that is light lavender in sunlight, becomes transparent as the sun sets.

Some experts believe that colored glass bottles will become more common under the brisk competition from plastic containers. Already under test: red milk bottles that researchers believe would connote "health" to consumers.

PPG President David G. Hill predicts, "Not only will both natural and artificial light be controlled (in houses of the future), but also the same glass will be energized to cool or heat a room without drafts. Air will pass through micro-openings. The porosity of these glass materials will be changeable. This will permit the control of cool or warm air to portions of the same room if desired."

How these goals will be reached still isn't completely clear, even to the experts. But glass technology is maturing fast, and few observers discount the glassmakers' ambitions.

EXPANSION

- The Small Business Administration (Lafayette Building, Washington 25, D.C.) has begun a new service designed to make it easier for small manufacturers to obtain current information on government-supported technical research and development. Further information is available at SBA field offices.
- Rohm & Haas Co. (Philadelphia) has signed an agreement for the acquisition of 140 acres along Route 309 expressway in Lower Gwynedd Township, in Montgomery County, Pennsylvania, as the site for a new research center.
- Crown Zellerbach Corp. (San Francisco) is realigning its research functions, has put W. M. Hearon in the new position of vice-president for research and development.
- Food Machinery and Chemical Corp. has formed a new epoxy resin application group at the firm's research and development center in Princeton, N.J. Laminates, castings, adhesives and surface coatings are the major areas of study.

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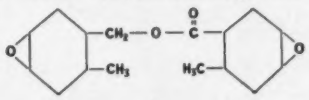

Freedom from color-unstable groups is the key to good light resistance. The photo below compares a dehydrated castor acid varnish compounded with UNOX 201 with a similar varnish from a conventional epoxy. Both were exposed to ultraviolet lamps for two weeks. The dramatic difference in performance in this accelerated test is borne out by exposures in a Model XW Weather-Ometer, and by outdoor exposures in Florida at 45° to the horizontal, facing south. The coatings based on UNOX 201 esters show superior gloss and color retention—performance in the range of finishes based on medium oil length alkyds.

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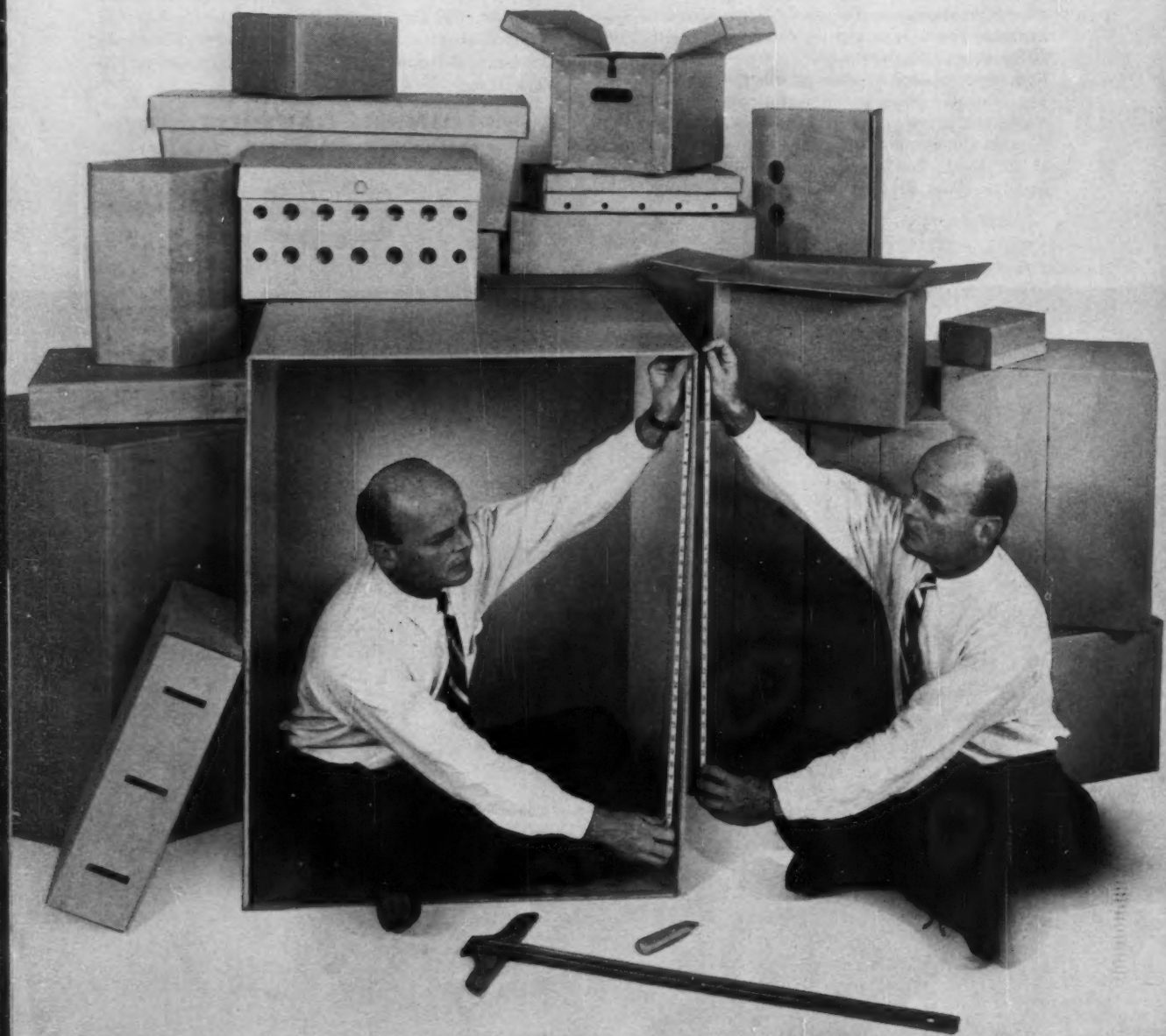

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Market Newsletter

CHEMICAL WEEK
September 3, 1960

Will benzene prices be increased during the last quarter? This is the hottest question being debated in the industry this week. Current prices are 34¢/gal., but there's much talk in the industry of official tabs being upped to 36¢/gal.

Although pressure is now strong to raise quotes, long-range considerations are causing producers to move with caution. However, the situation is so delicate at this time that a price increase by any large producer would surely touch off an industry-wide move.

Meanwhile, U.S. benzene production is soaring, pushing capacity to the limit (*CW, Aug. 13, p. 41*). While a good share of this output is for U.S. consumers, overseas demands have perked up strongly, adding more pressure for a price increase.

Exports of benzene took a big jump in first-half '60, moving up to 11 million gal. vs. 4 million gal. during the same period in '59. (Benzene exports in all of '59 totaled 7.3 million gal.) Dollar value of exports increased even faster, reaching $4.5 million during the first six months of this year, compared with $1.3 million in first-half '59—and $2.3 million for all '59.

But imports dropped 9.5% in the first half, and sales values were down only 7.5%, meaning that imports that are available are coming in at premium prices.

The above factors have tempted producers to boost tabs, which would mean an increase in the profit margins, would encourage additional producers to get into the field. And many petroleum companies are looking for additional opportunities to sell their by-products to the chemical industry.

New capacity is already on the way, will help to alleviate some of the problems now facing the industry. Meanwhile, additional output can be expected from a pickup in steel activities during the next few months. Producers are therefore faced with the prospect of holding the price line (perhaps ensure a better supply/demand balance during the next few years), or raise official quotes, encourage additional producers, which could set the industry back to the oversupply situation it was faced with two years ago.

•

Carbon dioxide in liquid form will continue to replace the harder-to-handle dry ice during the next 10 years, according to C. E. Wolfe, vice-president of Chemetron Corp.'s Cardox Division.

Last year, for example, 398,987 tons of liquid carbon dioxide were produced in the U.S., compared with 204.170 tons in '55, an increase of 95%. Meanwhile dry ice output dropped from 572,583 tons in '55 to

481,235 tons last year, a decrease of about 16%. Reason for preference for the liquid form: lower labor cost in handling, better and faster production methods, no storage losses through sublimation.

By '70, Wolfe predicts, dry ice production will have fallen off sharply, will account for 25% of total carbon dioxide production, compared with about 55% today.

•

CPI shippers are bracing themselves for the impending strike of the Pennsylvania Railroad by the Transport Workers' Union. The Pennsy's vice-president of operations, James P. Newell, says a strike looks "unavoidable" and CPI shippers already have diverted many shipments to other routes.

Although the union threatens a two-month strike, most CPI traffic men figure the federal government will step in before it goes that far. They add, however, that if it drags on for more than two weeks, many CPI firms will be hard hit. The Pennsy itself figures to lose over $2.5 million daily if the strike comes off. But even if it doesn't the road has already lost considerable business because of diverted traffic. And connecting carriers will be hurt too.

•

Piggyback shipment of bulk liquid chemicals moved a big step closer last week. The Chicago & North Western Railway won approval from the Assn. of American Railroads to haul highway tank trucks loaded with "restricted"—hazardous—commodities on flat cars. It's the first such approval granted any U.S. railroad.

CPI traffic men are not yet sure how imporant these piggyback shipments may become. Reason: rates, routes and schedules are yet to be worked out. It's clear, however, that they'll follow this one closely.

•

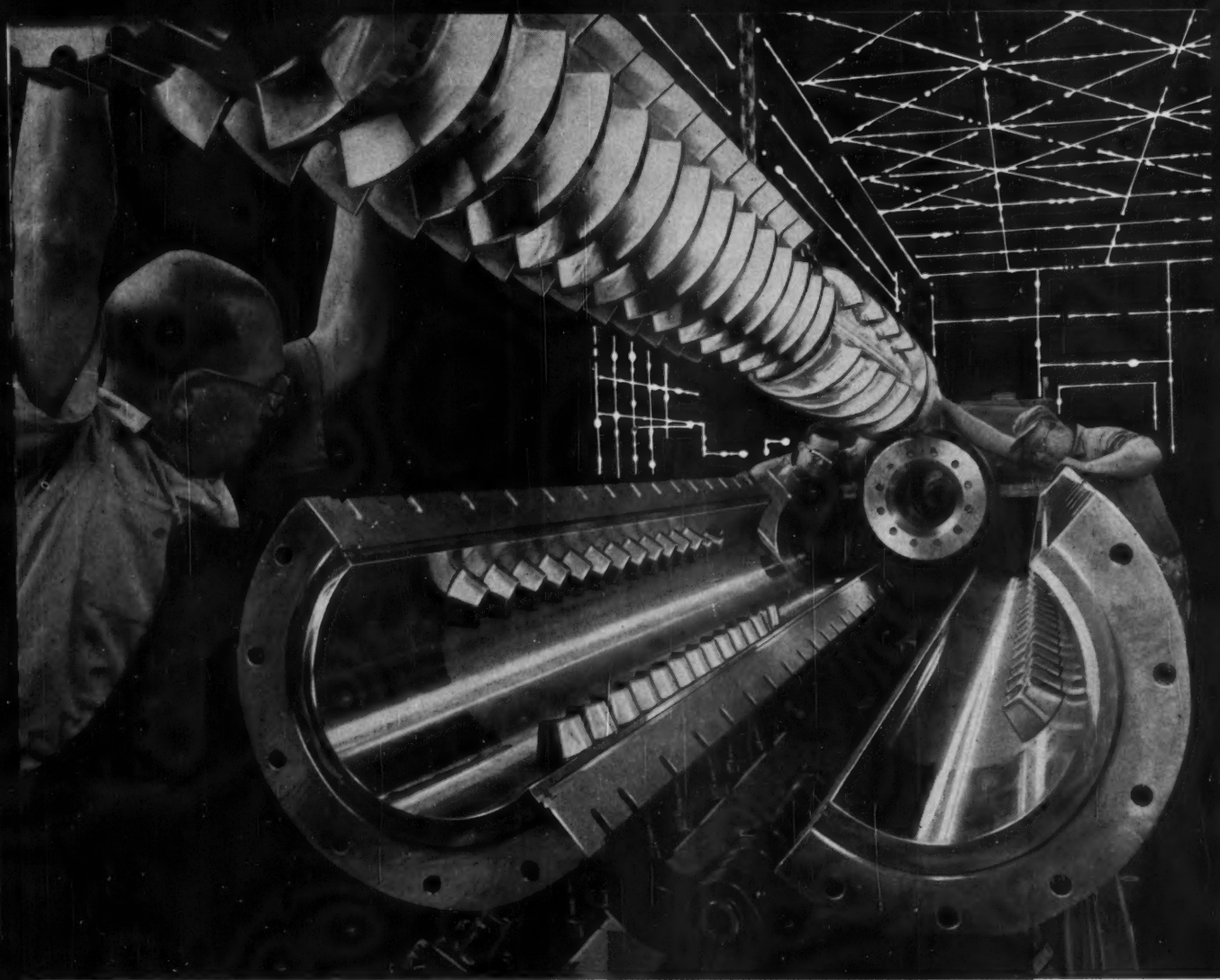
Liquid adhesive capacity in the South is increased 12 million lbs./year with startup of Morningstar-Paisley's new industrial adhesives unit at Atlanta, Ga. Warehousing and service facilities for other products are included.

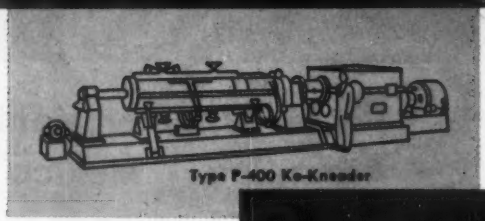
Output will be based on vegetable, animal, casein, synthetic resin and latex raw materials, with the adhesives being custom formulated for packaging operations and the manufacture of bags, envelopes, paper products, footwear and wood products.

•

Manufacture of chemical-grade iodine-131 is being undertaken by a private producer. Abbott Labs. (Chicago) reports it will offer the material in quantities of 100 to 500 millicuries, in disposable containers. Prices will vary from $55 for 100 mc. to $150 for 500 mc.

Main use will be in tracer systems for chemical reactions and process studies, with a large part of the outlet destined for Abbott's own use.

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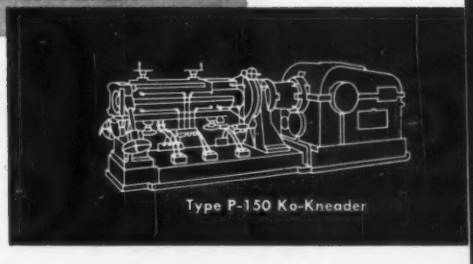
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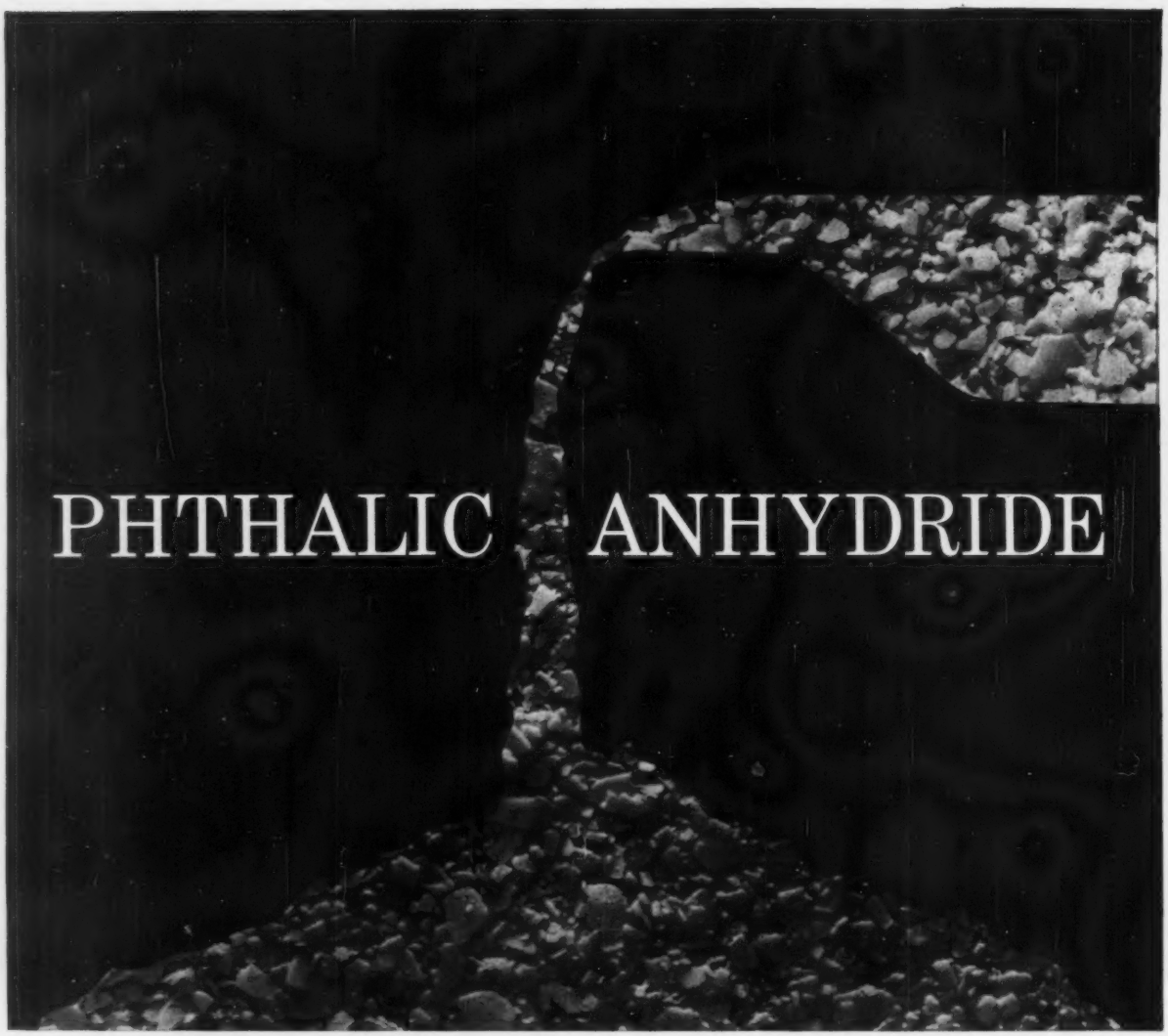

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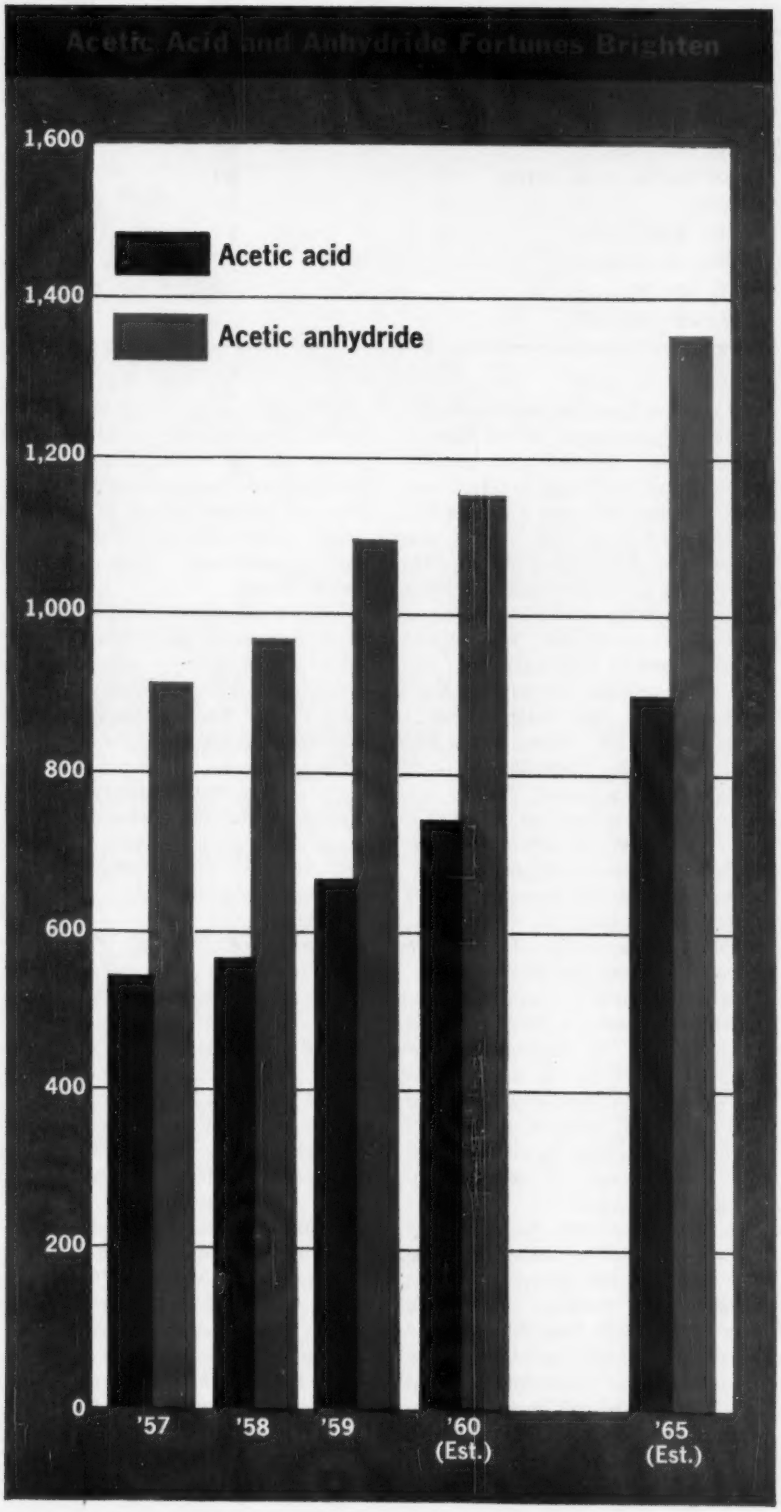
Hungry Plastics Markets Spur Acetic Output



After waiting out the doldrums of the mid-'50s acetic acid and acetic anhydride output moved to new highs in '59. And upward trends are continuing, spurred by rising vinyl acetate output and revived cellulose acetate production. To fill the growing needs for these raw-material compounds, acetic producers already have new capacity under construction. It's due in next year.

Government figures published this week show that vinyl acetate output (major outlet for acetic acid) hit an all-time high of 244 million lbs. in '59. Meanwhile resurging cellulose acetate output (major outlet for acetic anyhydride) topped the 500-million-lbs./year mark for the first time since '52.

Acetic Tops: During '59 acetic acid output increased a little more than did the anhydride, jumping 102 million lbs. to 668 million lbs./year, 18% over the previous year's mark.

The acid's outlook for '60 is encouraged by output performance during the first six months this year: 384 million lbs., 18% over production in first-half '59. If this rate continues, and most observers believe it will, output will easily top the 700-million-lbs./year mark for the year, may reach 750-760 million lbs.

Vinyl acetate is the major customer for acetic acid because most vinyl acetate producers—among them, Carbide, Air Reduction, Du Pont, and Pacific Carbide—employ processes based on the reaction of acetic acid and acetylene. Shawinigan also uses this process, makes the monomer at Shawinigan Falls, Que. (Celanese uses acetic anhydride and acetaldehyde as raw materials.)

Vinyl acetate output, only 106 million lbs. in '55, gained steadily thereafter, was unhalted even by the recession of '57-'58. The 244 million lbs. turned out last year was an increase of 130% over '55. Largest part of this increase (54 million lbs.) came last year.

Outlook for the acetate is still bright. Predictions are that by '65 over 300 million lbs./year will be produced.

Many Esters Help: Also contribut-

ing to the over-all growth of acetic acid are the rising sales gains of acetate esters—ethyl, butyl, amyl, methyl and isopropyl acetates. And the many and varied uses of these esters are expected to continue to grow, further buoying acetic acid need.

Among the big outlets for acetic esters: the manufacture of products such as celluloid, lacquers, perfumes, medicinals, artificial leather, synthetic flavors, polishes, cleaning fluids, household cement, coated paper, explosives, textile sizing, linoleum, nail polish remover and printing compounds. Growth—steady and unspectacular—seems assured for most of these items.

Output of the two largest acetic-consuming acetates hit new high in '59. Ethyl acetate production climbed to 101 million lbs./year, while butyl output, continuing a steady upward push during the past three years, topped 92 million lbs.

Another record performance: acetic salts; 19.9 million lbs. were made in '59.

Chloroacetic acid another acetic acid derivative, had an increase in volume in '59, but output was still below the 45-47 million lbs./year averaged during '55-'57. Chloroacetic is used in the production of carboxymethylcellulose and in the synthesis of 2,4-dichlorophenoxyacetic acid, base for 2,4-D weed killers..

Another growth factor in acetic acid's future is the burgeoning acrylate market. Celanese now uses acetic acid to make ketene, which is then converted into the acrylates. Recently, the company started doubling its acrylic producing facilities at Pampa, Tex.

With this solid foundation to build on, acetic acid demands during the next five years will continue to move upward, should near the 900-million-lbs./year mark by '65.

Cellulosics' Big Comeback: Acetic anhydride output broke the billion pounds/year mark in '59, as output increased 129 million lbs., 13% over '58. Another big year is now in the making. During first-half '60, output totaled 567.7 million lbs., 13% over the same period in '59. Demand is expected to continue so strong for the rest of '60 that it will hike production to near 1.14-1.15 billion lbs. Last December, monthly production hit a high of 104 million lbs. and so far this year has been over the 90-million-lbs./month level most of the time.

Production of Major Acetic-Consuming Chemicals

(million pounds)

	'57	'58	'59
Cellulose acetate	450	477	538
Vinyl acetate	172	190	244
Ethyl acetate	92	86	101
Butyl acetates	72	85	92
Chloroacetic acid, mono	47	38	43
Aspirin	18	21	18
Acetic acid salts	17	15	20
Methyl acetate	8	6	9
Amyl acetate	—	9	10
Isopropyl acetate	—	—	31

Production of cellulose acetate, acetic anhydride's biggest taker, rose to 538 million lbs., only 8 million lbs. below the high of '52. Output had dropped to 364 million lbs. in '54, the lowest production point for this chemical during the '50s; but since that time production has moved steadily upward each year.

Two of cellulose acetate's big markets — plastics and fibers — showed large gains in '59. Plastic outlets had been fluctuating between 133-139 million lbs./year during '55-'58. But last year output was up 22 million lbs. over '58, to 155 million lbs. Outlook for '60 is not as bright, however, and production will probably fall off about 10-15 million lbs.

Fibers now appear to offer the more hopeful market for the cellulosic. Output of cellulose yarn, monofilaments, staple and tow hit its high 444 million lbs. in '50, declined to a low 250 million lbs. in '56, is now gaining. Production moved up steadily to 300 million lbs. last year, and '60 will probably turn out to be another good year, with output of around 320 million lbs.

A quite important factor in the growth of cellulose acetate over the past few years was the opening of the cigarette filter market. While plain fiber requirements were dropping and plastics were static, cellulose acetate consumption for filters (not included in the fiber figures) rocketed from virtually nothing in '52 to about 60 million lbs. last year. The market is now leveling off, however, and little significant growth is expected. Currently, about half the cigarette market is for filter-tip brands, and this ratio will probably remain fairly constant. Most of the new growth in cellulose acetate filters will be due to population increases and a trend to slightly longer filters.

Sales of acetylsalicylic acid (aspirin), made from acetic anhydride, dropped off in '59, reversing a seven-year uptrend. After hitting a peak of 20 million lbs. in '58, acetylsalicylic acid production fell back to the '57 level of 18 million lbs. But during the first six months of '60, production rose to 12 million lbs., 28% over last year. After that strong first half, observers are predicting that output will reach an all-time high of 22-24 million lbs. for the year.

More Capacity on the Way: How much acetic acid and acetic anhydride producers can turn out is difficult to calculate. Large amounts of these products are recovered and reused in many processes. But new capacity is on the way, both from large producer-consumers, such as Union Carbide, and from several smaller companies.

Union Carbide is now building a plant at Brownsville, Tex., that will produce acetic acid, acetic anhydride and methyl ethyl ketone (MEK). Startup is expected early in '61. Meanwhile other producers are continually adding new capacity as demand increases.

Of the smaller producers, Sonoco has recently brought its Hartsville, S.C., plant onstream, makes acetic acid from waste products. Next year the company expects to sell $1 million

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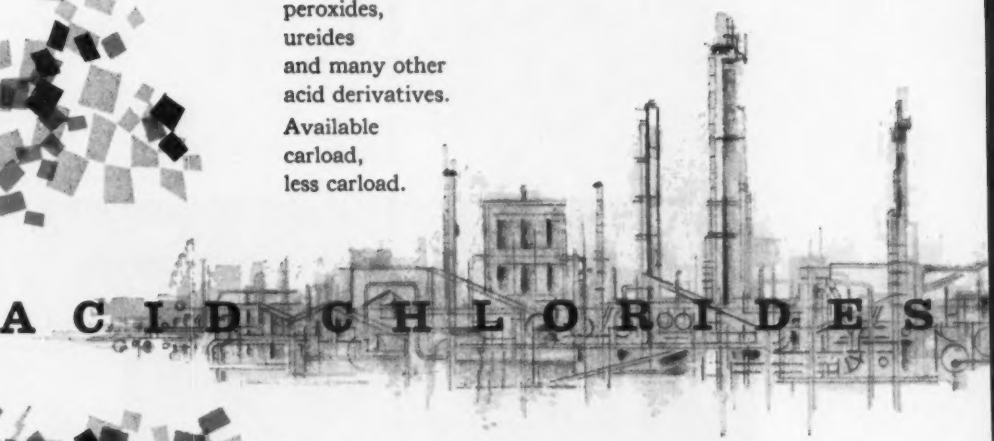

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Adipoyl Chloride
Azelaoyl Chloride
Butyroyl Chloride
Caproyl Chloride
Capryloyl Chloride
Cinnamoyl Chloride
Decanoyl Chloride
Isobutyroyl Chloride
Isovaleroyl Chloride
Lauroyl Chloride
Myristoyl Chloride
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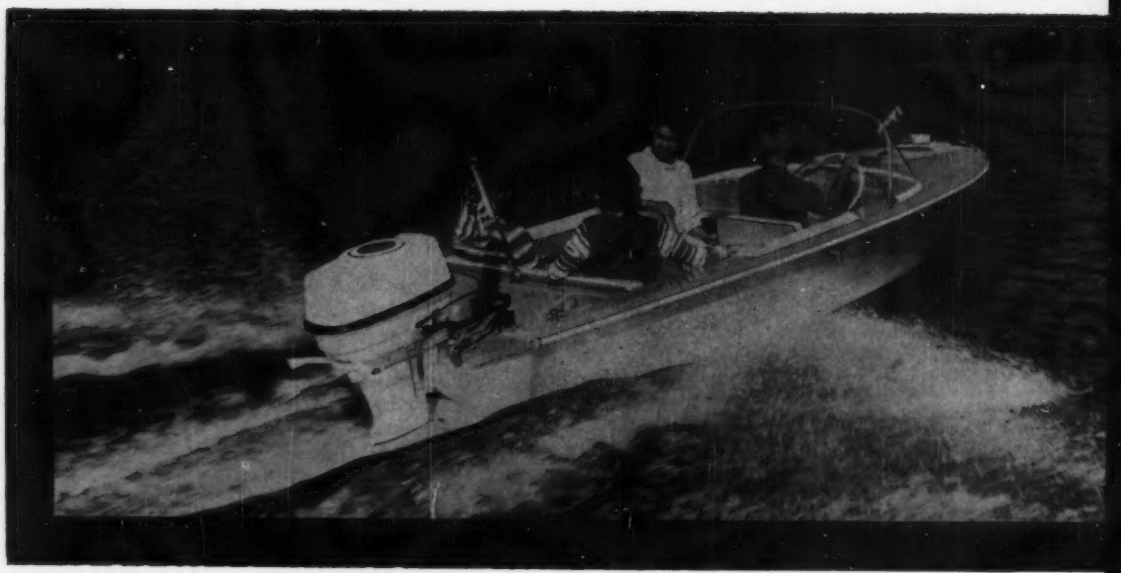

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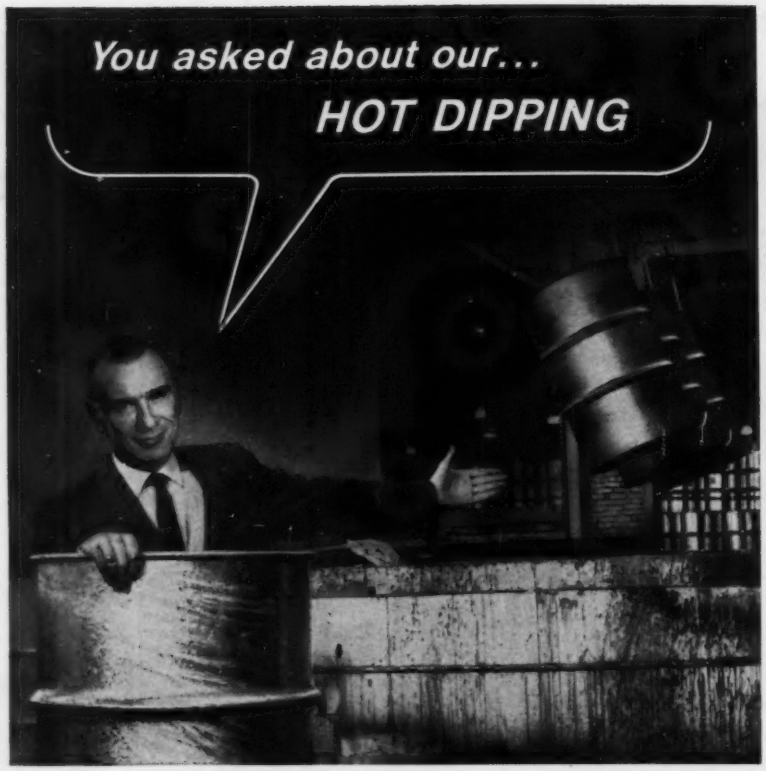

Here's Clem Erb, Republic Container salesman, to tell you all about it

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"That's why I heartily recommend Republic Containers to my customers and to anyone requiring the protection afforded by a hot zinc or tin coating. That's why I am always happy to take orders for any number of galvanized or tinned drums. Readers should call *their* Republic salesman or write the headquarters in Niles—*Container Capital of the World*—for complete details."

Republic Steel Drums, in 20- to 55-gallon capacities, include: Light Gage Class ICC-17E, 17H, 17C, 6J; Heavy Gage Class ICC-5, 5A, 5B, 5C, 17F, and certain ICC-6 Series. Finishes include plain, decorated, hot dip galvanized, hot dip tinned, lacquer lined. *A full line of Republic Steel Packages* are also available from 3½- to 20-gallon capacities—26- to 20-gage plain steel—lined and decorated to specifications.

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worth of acid (about 10 million lbs.).

It all adds up to an encouraging future for acetic acid and anhydride. The industry has a more solid basis upon which to grow—vinyl acetate, acrylates, cellulose acetate, to name a few, all have the growth potential to keep output of acetic starting materials rising during the next decade.

Dye Market Strong

Preliminary reports on dye production in '59, issued last week by the U.S. Tariff Commission, reveals a reversal of the three-year downtrend in dyestuffs output.

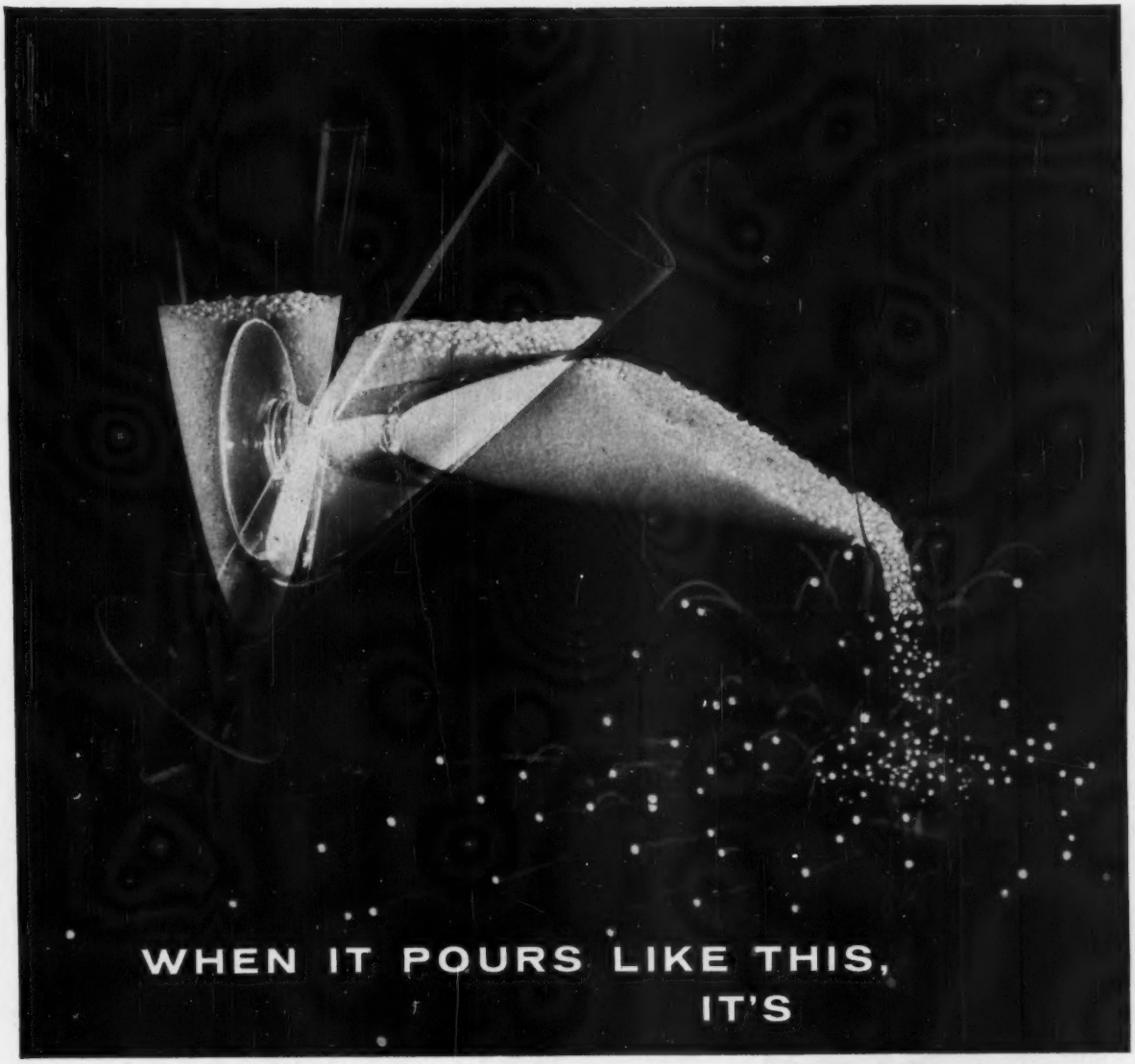
U.S. production of dyes rose last year, totaled 168 million lbs.—20% more than the 140 million lbs. turned out in '58 and 17% greater than the 143 million lbs. in '57. Still this was well below the 196-million-lbs. output in '50 and 39 million lbs. below the '51 mark. The only other year during the '50s when production was higher was in '55.

Also up were sales—in both volume and dollars. Sales were the highest since '51 (188 million lbs.), totaled 157 million lbs., some 13% higher than in '58. Dollarwise, the industry closed out the decade with its largest figure, $203 million. This was $13 million over '51, high point during the past decade.

Four Major Categories: With respect to dyes grouped by class of application, more than 70% of total output was accounted for by four types of dyes: vat, 28% of the total; sulfur, 19%; direct, 15%; acid, 9%. Each was higher in '59 than in '58. Production of acid dyes increased the most, 36.5%. Sulfur dyes were second, up 24%; while direct dyes were 19.5% larger and vat dyes 13.9% larger. Output of a fifth-ranking group, azoic types and components, was 3.4% more than the 8.8 million lbs. reported in '58.

Output of the remaining classes of dyes were way up last year. Mordant dyes were 66% higher; solvent dyes, 22%; dispersed dyes, 22%; basic dyes, 21%; food, drug and cosmetic dyes, 11%; and fluorescent brightening agents, 20%.

Chemical Angle: From the chemical composition point of view, five classes of dyes accounted for 80% of total output. Azo types took 30%; anthra-



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Chemical Week

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quinone, 20%; sulfur dyes (not including vat sulfur dyes), 19%; indigoid, 7%; stilbene, 6%.

Production of all five classes were up over '58. Largest growth was by stilbene dyes, which increased 32%, while both azo and sulfur types moved up 24%; indigoid, 17%; anthraquinone, 14%.

Of the remaining dyes, two declined in '59. Phthalocyanine types were down 35% from '58, while ketone imines dropped 5%. Production of others showed increases over '58 output.

Intermediate Spurt

Another example of the chemical industries' big spurt in '59 is evident in the report on production of cyclic intermediates released by the U.S. Tariff Commission this week.

Higher production during '59 pushed cyclic intermediates up 27.3% over '58, set a new record at the same time for this group. Total output was 8.5 billion lbs, almost 2 billion lbs. higher than in '58, and 1.7 billion lbs. above the previous record in '57. Most of these products are captively consumed, and the Tariff Commission indicates that 60% of the output was used by the producing concerns in manufacture of other products.

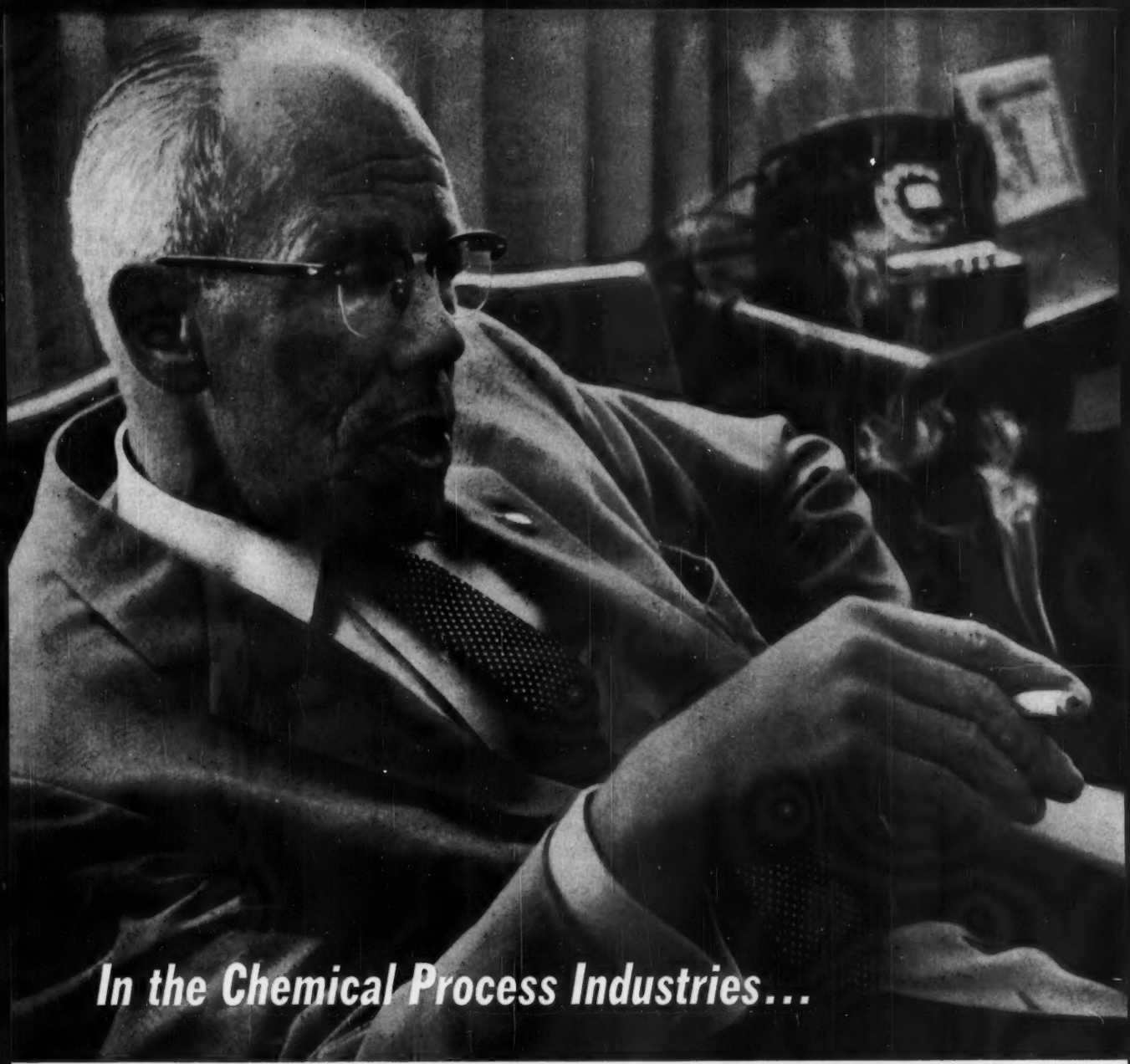
New sales records were also set. Sales amounted to 3.5 billion lbs., 33% over the previous high of 2.6 billion lbs. turned out in '58.

Dollarwise, sales of $555 million were 26% greater than in '58, and $104 million more than the previous record set in '57.

Two of the largest-volume intermediates exceeded the 1-billion-lbs./-year mark for the fourth successive year. Styrene output was 1.571 billion lbs., 28% more than in '58, while output of ethylbenzene (used almost entirely in styrene manufacture) was 1.423 billion lbs., 21% higher than in '58.

Output of other large-volume intermediates that increased substantially over '58 levels include: monochlorobenzene, up 45%; phenol, which jumped 37%; cumene (used as a raw material in some phenol operations), up 20%; cyclohexane 17%. Both naphthalene and phthalic anhydride output moved up at a good clip, despite the effects of the steel strike.

Naphthalene production increased



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17% over '58, while phthalic anhydride output was up 19%. The disruptive effects of the steel strike cut off the supply of coal tar, from which naphthalene is recovered. Since naphthalene is the major raw material for the manufacture of phthalic anhydride, output of both products was held down because of the shortages of coal tar.

Meanwhile production of orthoxylene, which is also used as in intermediate for phthalic anhydride, was reported for the first time by the Tariff Commission. Producers turned out 62 million lbs. in '59, but output is expected to increase sharply in '60 due to two factors: expanded capacity, plus large shipments to foreign countries, such as Japan and Italy, for manufacture of phthalic anhydride (*CW Market Newsletter, Aug. 6*).

MARKETPLACE

Epoxy Chemicals: Commercial availability, plus lower prices for a new epoxy coreactant have been reported by General Mills. New tabs on the company's XR-200 epoxy coreactant have been cut from $1.50 to 95¢/lb. in truckload or carload lots. The move follows commercial availability of the product from the firm's Kankakee, Ill., plant.

•

More Maleic: An additional 20 million lbs./year of maleic anhydride production capacity has been put onstream by Monsanto Chemical Co. at St. Louis, Mo. With the latest expansion, the company's output potential will be upped 50%, putting capacity at 60 million lbs./year.

•

European Market Study: The European chemical industry will be the topic of the Chemical Market Research Assn.'s conference at Portsmouth, N. H. this month (Sept. 22-23). Several prominent European marketing men on the speakers' list: H. G. Sinkel, director of sales, Chemische Werke Huels (Germany); John Townsend, director of sales, Imperial Chemical Industries Ltd. (England); Guilio Ballabio, manager of Hydrocarbons and Derivatives Division, Montecatini (Italy); Jacques Roche, delegate, Union of Chemical Industries, (France). Further information and registration forms are available from CMRA, 100 Church St., New York 7, N. Y.

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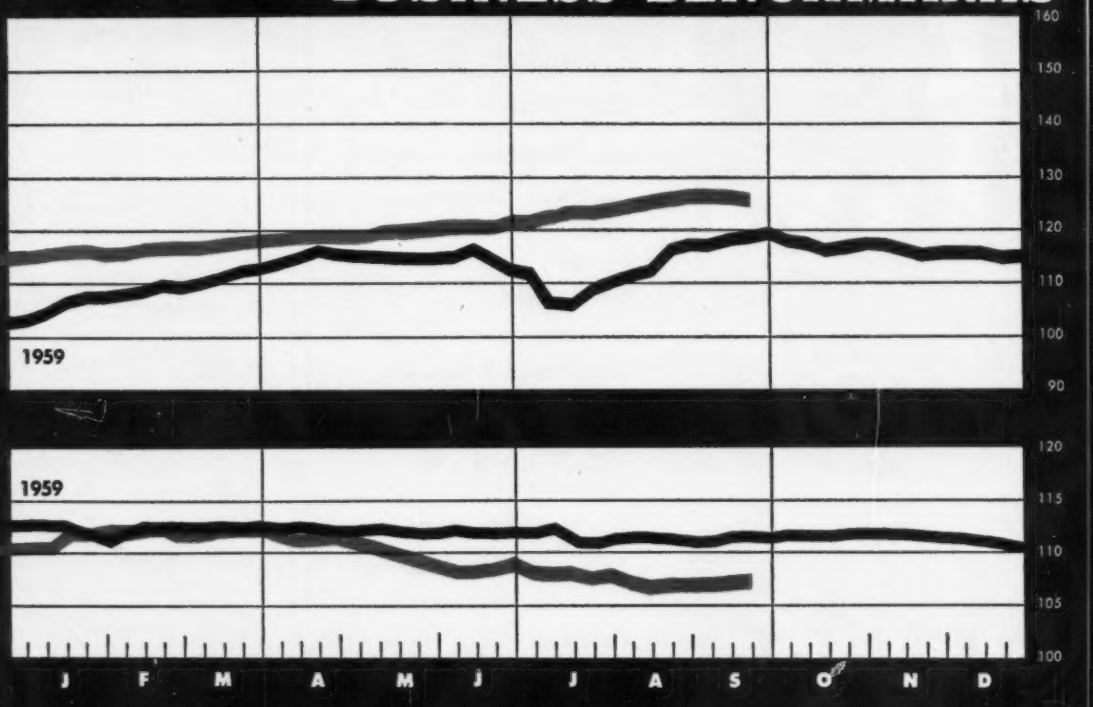

SEPTEMBER 3, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1957=100)	124.0	125.5	118.3
Chemical Week wholesale price index (1947=100)	108.5	108.0	110.7
Stock price index (12 firms, Standard & Poor's)	49.93	48.64	59.73
Steel ingot output (thousand tons)	1,552	1,558	332
Electric power (million kilowatt-hours)	14,454	14,622	14,003
Crude oil and condensate (daily av., thousand bbls.)	6,842	6,834	6,761

TRADE INDICATORS (million dollars)	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	*Preceding Month*	*Year Ago*	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	30,770	30,990	31,248	55,160	54,950	52,138
Chemicals and allied products	2,380	2,350	2,125	4,100	4,080	3,768
Petroleum and coal products	3,150	3,180	3,095	3,320	3,340	3,366
Paper and allied products	1,060	1,040	1,042	1,590	1,580	1,492
Textile products	1,270	1,290	1,281	2,740	2,710	2,532

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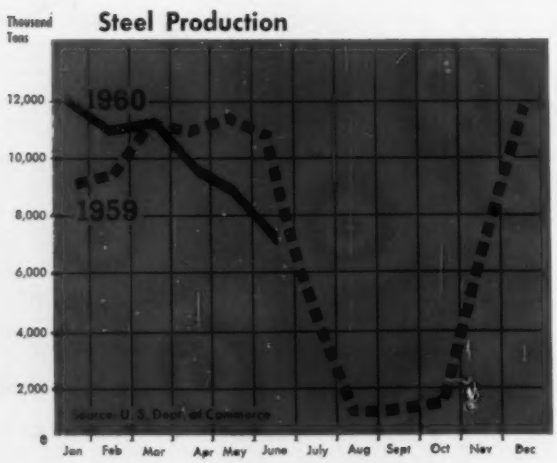

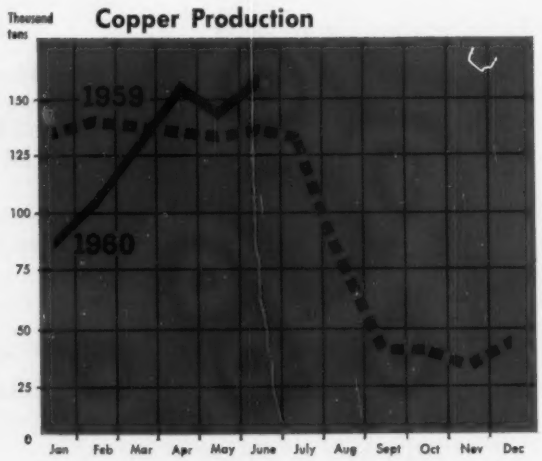

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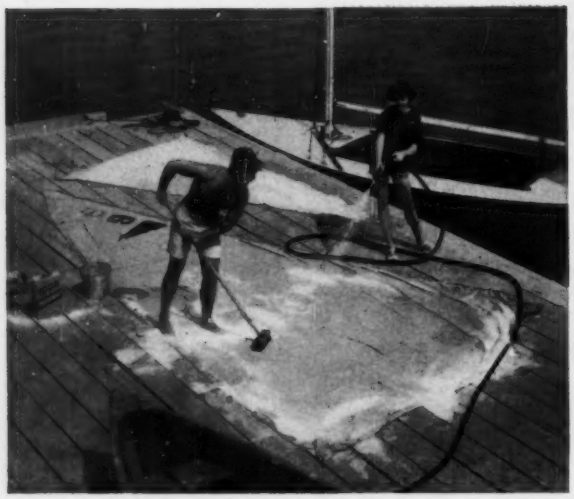
WHAT'S NEWS IN CHEMICALS



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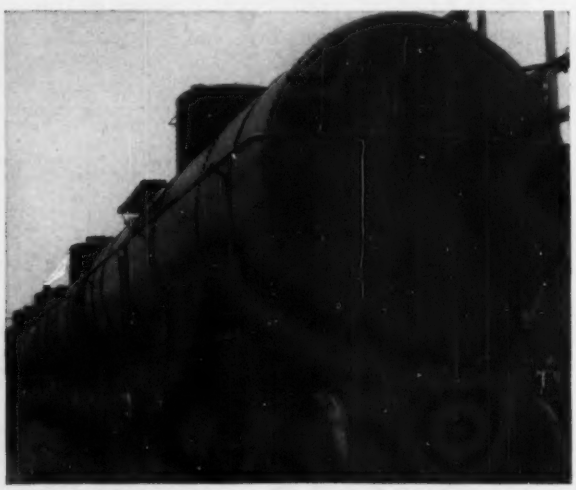

QUICK SHIPMENTS — Shipments are made from conveniently located plant and storage facilities. Surfactant manufacturers are assured of prompt delivery and high uniform product quality when they order from Enjay.

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Manufacturers of surfactants need look no further than their nearest Enjay office for their raw material and technical service needs. A complete line of chemicals for light- and heavy-duty detergents—powdered or liquid—as well as emulsifiers, wetting agents and foam stabilizers are available for prompt delivery.

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Enjay also markets other chemicals for surfactants. These include Isooctyl Alcohol—Tridecyl Alcohol—Decyl Alcohol—Isopropyl Alcohol—and Ethyl Alcohol. For further

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